

The MINING CONGRESS JOURNAL

THE FEDERAL BUDGET SITUATION *By Hon. Ogden L. Mills*

Constructive Industrial Development

By John B. Reynolds

The Coal Convention a Great Success

**Mechanized Loading Classified by
Seam Heights**

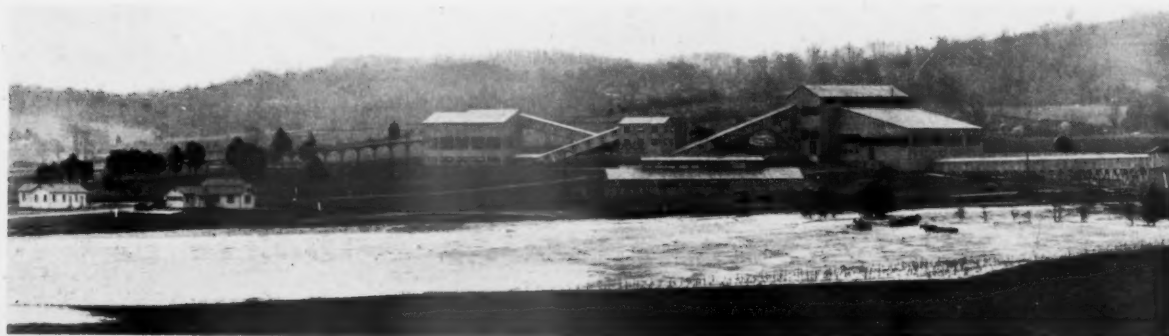
By G. B. Southward

**Fuel Utilization—Five Angles of this
Problem**

*By Ben L. Boalt, Lorin W. Smith, Jr.,
Carlyle M. Terry, Milton E. Robinson,
Jr., and Dr. John R. Turner*

**Universal Exploration Com-
pany's Operation in East
Tennessee**

By E. E. Ellis





"You may fire when you are ready, Gridley" (Admiral Dewey at Manila Bay)

WHEN the emergency came in 1898, after more than thirty years of peace, the ships of the American Asiatic Fleet were ready. Their powder was dry, their guns were clean, their boilers, and engines were dependable.

The quickly-won battle was a victory for faithful observance of rules.

Every coal-mining operation represents a constant battle against forces which will bring disaster quickly if allowed to gain the upper hand. Good rules, rigidly enforced, are even more essential underground than on the sea.

As the largest manufacturers of safety fuse for blasting we urge especially strict regulations regarding the use of explosives.

Do Not "Short Fuse"
—Fuse should be cut long enough for the end to extend well out of the mouth of the bore hole when the primer cartridge is in place.

All holes should be well tamped.

THE ENSIGN-BICKFORD CO.

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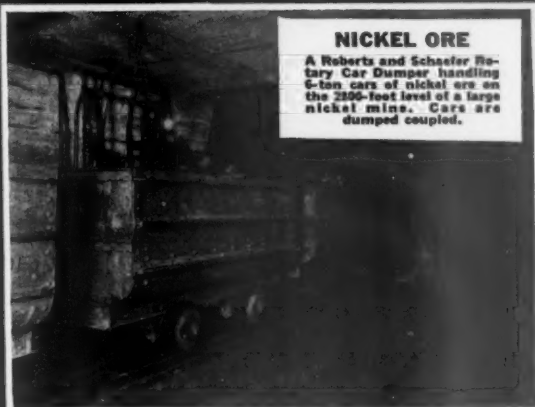
ROBERTS AND SCHAEFER

Rotary Car Dumpers



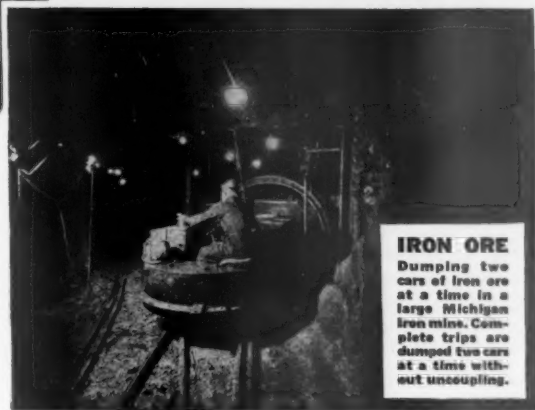
ZINC ORE

Zinc ore cars at a large zinc mine all dump uncoupled with Roberts and Schaefer Car Dumpers—an ideal arrangement where locomotives are run over the dumper.



NICKEL ORE

A Roberts and Schaefer Rotary Car Dumper handling 6-ton cars of nickel ore on the 2300-foot level of a large nickel mine. Cars are dumped coupled.



IRON ORE

Dumping two cars of iron ore at a time in a large Michigan iron mine. Complete trips are dumped two cars at a time without uncoupling.

SAVE THIS MONEY!

If you are now using antiquated car dumping equipment or none at all, you are losing money on every lump of ore. The reason might be limited capital or you are just putting off the day when you'll have to buy improved dumping equipment to reduce costs. But you don't have to spend the money—you don't have to put it off! Let RandS Engineers make a survey of your requirements and an estimate of savings possible with this equipment. If the estimated savings justify the expenditure, everything will be gained.

And RandS can do it for any mine, regardless of conditions, for our car dumping equipment is made in all sizes and types to suit *every need*, with electric car feeders, spraggers, cagers and other accessory equipment designed to meet the individual specification.

Write us now on the subject of improved car dumpers—we may have just made an installation that would apply admirably to your case. Even though you are at present completely equipped, there may be an important problem that needs solution. We at least want you to have complete blue prints and bulletins. We will appreciate the opportunity of fulfilling your requests without the slightest obligation.

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ENGINEERS and CONTRACTORS



PITTSBURGH, PA., 419 OLIVER BLDG. WRIGLEY BUILDING, CHICAGO HUNTINGTON, W. VIRGINIA, 314 NINTH AVE.

THE MINING CONGRESS JOURNAL

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Practical Operating Men's Department

METAL

*Universal Exploration Company's Opera-
tions in East Tennessee*

COAL

*The Automatic Regulator as the Coal
Man's Ally
The Stoker and the Future of the Coal
Industry
Progress in Dealer Education and
Consumer Service
The Retail Dealers' Activities and Needs
in Furthering Coal Utilization
Research on Coal for Utilization*

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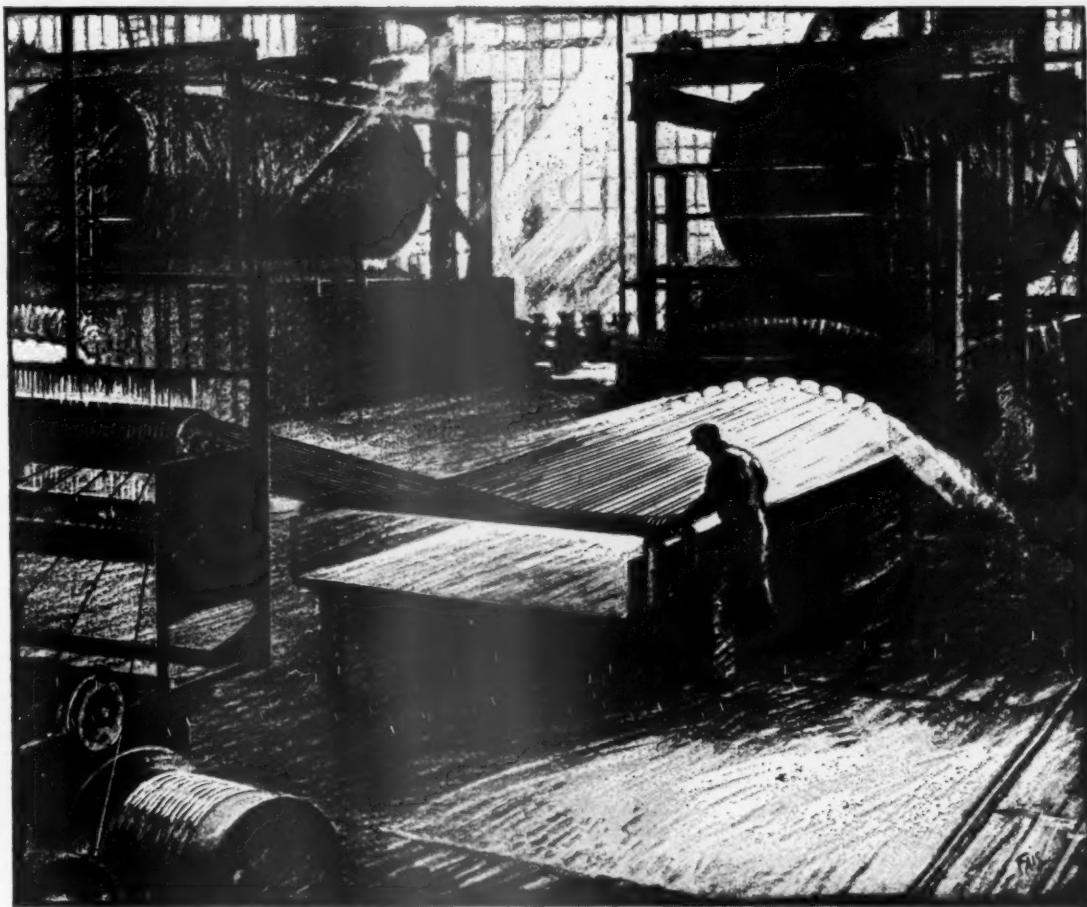
Edited under the supervision of James F. Callbreath, Secretary of The American Mining Congress

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No. 9 of a series of advertisements on "How Superlative Quality is Built into Roebling Wire Rope"

Painstaking Care is the Watchword

When it comes to making wire of exceptionally great strength and stamina, such as required for Roebling "Blue Center" Steel Wire Rope, ordinary production methods won't do. Skill of the highest order is called for. Painstaking care must be the watchword.

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ing process—have been established through decades of research and development.

Patenting, at Roebling, is a highly developed art—one that contributes much to the great strength and stamina for which Roebling "Blue Center" Steel Wire Rope is noted. Incidentally, the Roebling patenting shop is one of the largest and most modern of its kind in the country.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

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CABLES · WIRE CLOTH AND WIRE NETTING

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ROEBLING



WIRE ROPE

Allis-Chalmers

Equipment

for the Metal

Mining In-

dustry

With its complete engineering and manufacturing organization Allis-Chalmers is in an unrivaled position to meet the requirements of the metal mining industry.

Allis-Chalmers machinery has a part in every operation from the time the ore is mined until the pure metal is discharged from the casting machine. Allis-Chalmers crushers, jaw and gyratory, reduce the ore to a size small enough to go through the rolls, from the rolls it is sent to rod, tube or ball mills for fine grinding.

In addition to crushing, grinding and screening equipment, Allis-Chalmers also supplies hoists, underground power shovels, perforated metal classifiers, jigs, feeders, smelting machinery, casting machines, pumps, motors, Texrope Drives—in fact all the principal equipment needed for a complete crushing, grinding and smelting plant.

In view of the experience of the Allis-Chalmers engineering organization and unsurpassed manufacturing facilities no order can, of course be too large or too complex for careful efficient handling.

ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee —

Ore Moving Power Complete in the Jeffrey Line . .

From the small but powerful Trammer, to the big husky yard haulage locomotives, Jeffrey offers you a complete service in ore moving.

Every unit is the product of years of experience in building mining locomotives of all types. Jeffrey engineers know mining, and build for miners.

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Available on trolley types. Two contactors in series on the positive side take the main break between first position and "off." No main current broken in the drum controller, which is otherwise standard. Controller is in negative side of line, so there is no difference of potential between case and contact cylinder. Renders arcing, burning of contact fingers or casing impossible. All the essential advantage of contactor control without its expense and complication.



LARGE TROLLEY

Built for main haulage and for switching duty around smelters and concentrating plants. Can be supplied with two or more motors and air or hand brakes. Optional—contactor or ground potential control.

THE JEFFREY MANUFACTURING CO.

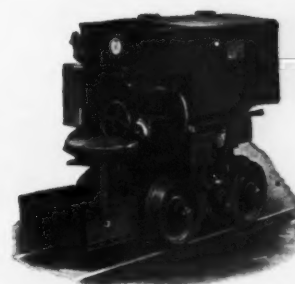
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Branch Offices: New York Chicago Philadelphia Pittsburgh
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JEFFREY TRAMMER

Small but powerful trammer available either in trolley or battery type. Enters any tunnel a mule can. Operator's platform readily removed for entering the cage.



STORAGE BATTERY

Heavy for mine and quarry haulage. Side and end frames may be either steel channels or steel slabs. Equalized, automatically locking screw brakes are standard. Battery box mounted on pivot to permit swinging across chassis, rendering motor and other parts accessible for inspection and repair.



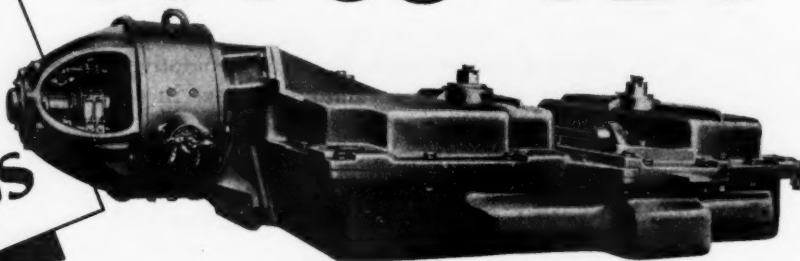
TROLLEY HAULAGE

Rolled steel slab side frames cut to provide accessibility to brake rigging. Standard type mine motors. Optional—contactor or ground potential control.

JEFFREY METAL MINE EQUIPMENT

**PAYS FOR
ITSELF
Many Times
in
POWER
SAVINGS**

The New COSCO "C-20"



The First Shaker-Conveyor Drive
Built on an Absolutely

NOT content with its many hundreds of successful installations of the most efficient Shaker Conveyor Systems ever developed for American mining conditions, Cosco engineers have now surpassed even their own former attainments.

To do it, they had to completely revolutionize the basic principle of conveyor drives, used during the past 45 years.

For the first time, details of construction have been scientifically studied, measured, arranged and rearranged until the very maximum peak of operating efficiency was reached. Even the shape of the drive housing was radically improved to permit the compactness required for low roof and other restricted space conditions.

As a result the new COSCO "C-20" Drive, embodying these new principles, is actually 50 per cent more efficient than any previous type.

In power savings alone it will pay for itself several times during its normal life.

NEW PRINCIPLE

In addition its capacity is greatly increased. Its operation is smoother and quieter. It performs superlatively on steep grades.

There was nothing ever before resembling the "C-20" Drive or which compares with it in performance or economy.

It is destined to lead for a long time because its patented features cannot be duplicated or even successfully imitated.

If you value superior performance in your mine conveyors, if you seek greater output, if you care for economy—you should at once invite COSCO engineers to discuss the adaptability for your mines of the "C-20" Drive—American designed, American built, from American materials, for American conditions.

Such an invitation will obligate you in no way.

Write for Special "C-20" Drive Circular.

Convey Your Coal
THE
COSCO
WAY

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299 Broadway, New York

The New COSCO "D-8"



Works Efficiently Where a
Bigger Drive Would be Wasteful

at ONE-FIFTH THE COST

ECONOMIC needs have brought economic measures in many fields. Why not in coal mining?

One of the most wasteful wasters in coal production is the use of high power where less power will do the work.

If a dwarf is equal to a task, why employ a giant? That is the question Cosco engineers asked themselves—and then answered it with the new "D-8" Conveyor Drive.

The "D-8" is the smallest, most compact drive made—easily portable and sturdily built to do the day's work without fuss.

It operates efficiently with a 5 to 7½ H.P. motor, but is built to withstand the strains of a 10 H.P. motor. The design, however, permits not larger than a 7½ H.P. motor to be mounted—thus providing definitely against overloading by over-

enthusiastic owners. For, after all, it's a little fellow and there IS a limit to the burden it will carry.

Efficiency is its middle name—the most consistent worker at the lowest operating cost ever obtained in a drive of its size.

It is a fit running mate in every respect for the new Cosco "C-20," the drive which has completely revolutionized all previous ideas of conveyor drive performance.

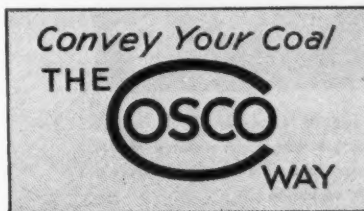
The "D-8" is the ideal small-space drive for conveyors feeding larger systems, or for any other work where a comparatively short line of troughing is to be used.

Cosco Conveyors are saving money for both large and small producers. Hundreds of successful installations are upholding the Cosco reputation in American mines.

Cosco Conveyors, Troughing and "Duckbill" are 100 percent American. Built in America—to American standards—by American workmen—from American materials.

Let our engineers demonstrate what Cosco can do for you in increased production, or lower cost, or both.

CONVEYOR SALES CO., INC.
299 Broadway, New York

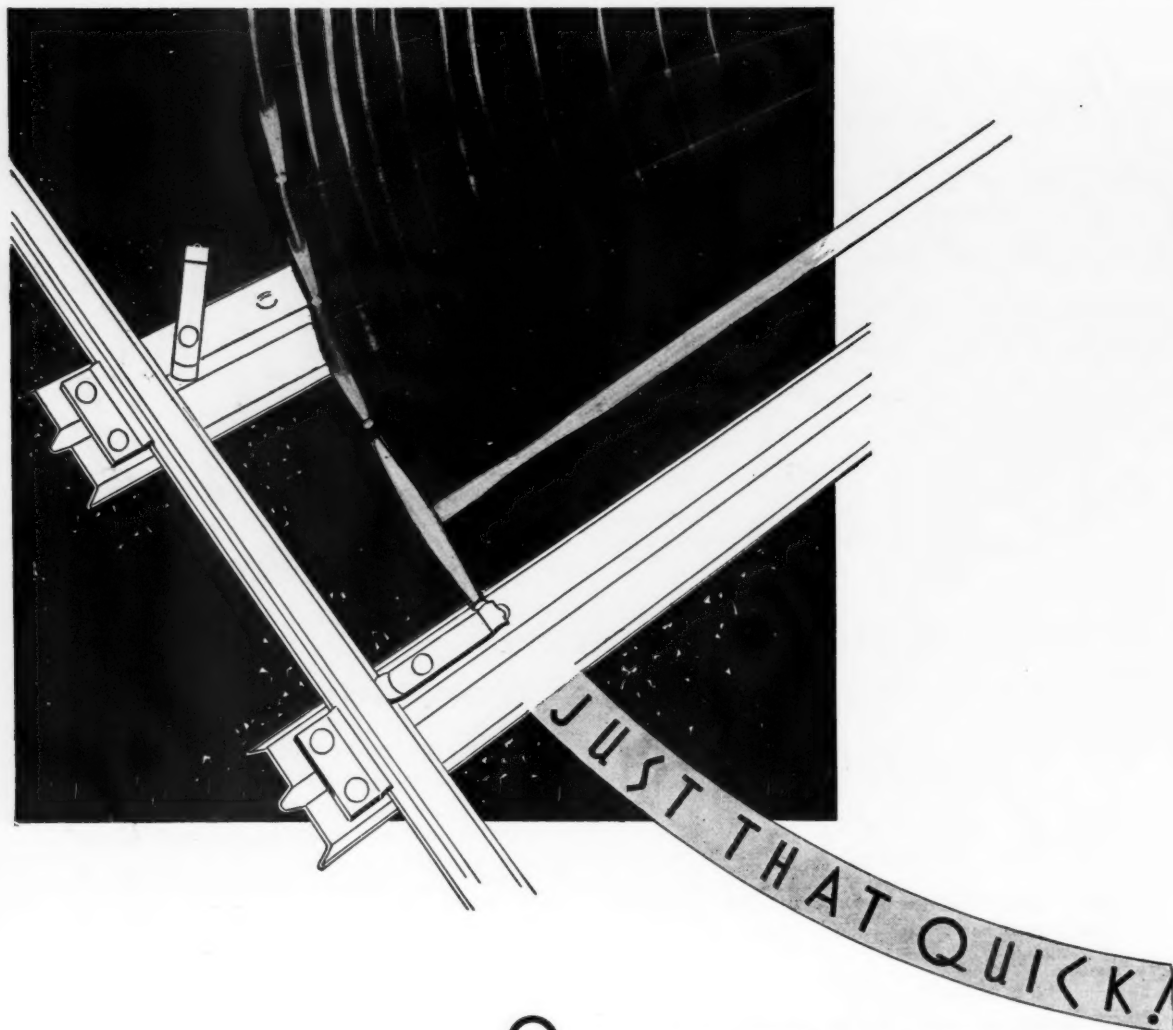


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Scranton, Pa., Mears Bldg.
Charleston, W. Va.,
5 Baines Court.

Middlesboro, Ky., 331½ West, Chester Ave.
Salt Lake City, Utah, Salt Lake Hardware Co.
Denver, Colo., Stearns Roger Mfg. Co.

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Chicago, Ill., 224 So. Michigan Avenue.
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DISTRICT
SALES
OFFICES



ONE blow of a hammer! That's how quickly and easily Carnegie Copper Steel Mine Ties may be laid. The outside fastening is securely riveted to the tie. The inside clip clinches the rail, insuring true-to-gauge construction. No special tools or fittings are necessary in laying the ties. Merely a hammer blow to lock the clip!

Carnegie Copper Steel Mine Ties are efficient tools of modern mining. They are rust-resistant, thus assuring a much longer life than ordinary steel ties can give. They are made in a number of styles and sizes, varying from $2\frac{1}{2}$ to 9 pounds per foot, and from $1\frac{1}{16}$ " to $2\frac{1}{4}$ " in height. There are light ties for room work and heavy ties for main haulage . . . ties for soft bottom and ties for low ceiling. A variety of clips and fastenings is also available. Our catalogue tells the whole story. Send for your copy today.



A very popular Carnegie Tie is M-26A with double locking clips, pictured above. Many prefer the double clips which insure a firmer grip on the tie.

CARNEGIE STEEL COMPANY - PITTSBURGH

Subsidiary of United



States Steel Corporation

113

CARNEGIE COPPER-STEEL MINE TIES



The several distinct advantages of Joy loaders

THE stream of coal from Joy loaders is rapid and uninterrupted—a capacity of two tons or more per minute is guaranteed. The machine moves on track or on caterpillars, rapidly from place to place. It maintains schedules at high capacity. Loading is completely mechanical. One man controls all operations. It is so sturdy that loading records become consistently greater annually for individual machines—it offers proven cost reduction. It is adaptable to all systems of mining. The 5 BU is for coal 60 inches or more in height and the 7 BU for seams from 48 to 60 inches. Because of its flexibility many factors ordinarily deterrent to mechanical loading can be overcome by Joys. We will be glad to tell you how unusual conditions—some probably like yours—have been met successfully at other mines.

JOY MANUFACTURING COMPANY, FRANKLIN, PENNA.

MIAMI'S AUTOMATIC HOIST

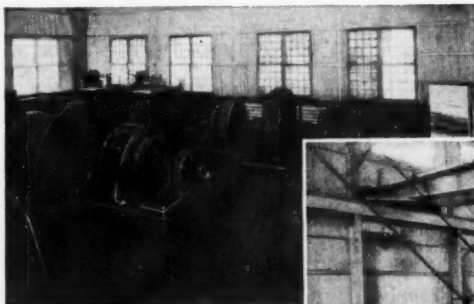
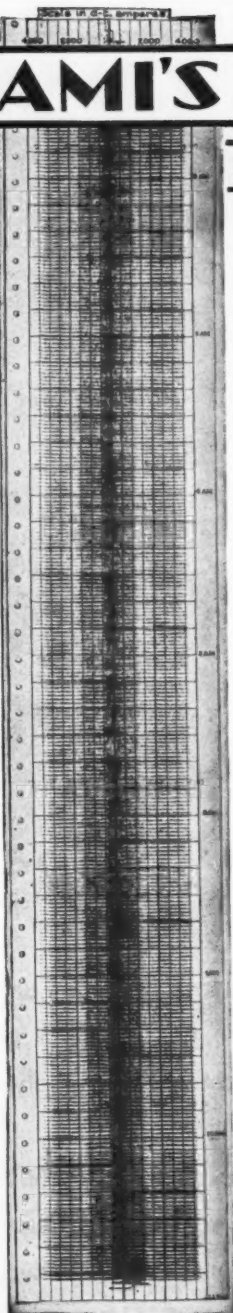
SHOWS REMARKABLE PERFORMANCE

OUT IN Miami, Arizona, the highest-speed automatic hoist in the world is boosting production for its owner, the Miami Copper Company.

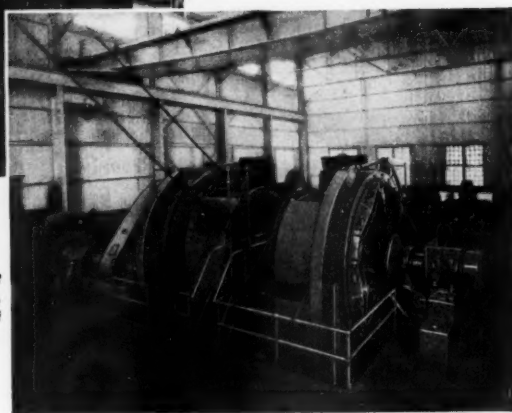
Reproduced on this page is a typical metered record of the performance of this hoist during a single shift—in this particular case the "graveyard shift," between 11:00 p.m. and 7:00 a.m. During the seven hour and thirty-eight minute run so graphically illustrated, Miami's automatic hoist made 655 trips—one trip every 42 seconds—*regularly*, without holdups.

The regularity and evenness of this chart are primarily the result of G-E automatic control. Such regularity makes for highest efficiency of operation. The exact timing of every trip, giving the remarkably uniform current peaks shown, results in power saved—reduced costs. These combined factors have helped make possible the mining of low-grade ore at a profit.

Mining specialists in your nearest G-E office will gladly tell you more about G-E electric equipment for hoisting. Why not address them, stating your power requirements?



G-E flywheel motor-generator equipment (two duplicate sets) supplying the duplicate high-speed hoists, Miami Copper Company, Miami, Ariz.



One of two G-E 1400-hp. d-c. hoist motors geared to hoisting drums, total motor capacity 2800 hp., Miami Copper Company, Miami, Ariz.



JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

237-47

Typical illustrations of power needs for heavy-duty service.



Check your Power Circuits for Safety and Operating Costs



There are Anaconda Wire and Cable products for *every* coal mining requirement, among them—

Power cable for coal cutting machines, lighting and mine ventilation service.

Trolley wire of Hard Drawn Copper or high conductivity heavy-duty Bronze.

Weatherproof wire for lighting circuits.

Locomotive gathering cable for use in remote headings.

Signal cable of every type, single or multiple conductors.

Rubber-covered wire, magnet wire, flexible cords, etc., etc., etc.

Are your electrical conductors of ample size to take care of the load imposed upon them now . . . to say nothing of *additional* load for underground mechanization?

We urge you to check this vital factor for two reasons—1. Potential fire hazard; and 2. Monetary loss caused by wasted heat energy (power or $I^2 R$ losses.)

Why not *measure* the electrical efficiency of your power circuits? Our Engineering Department will gladly assist you in determining the facts and will recommend conductors of the proper size.

ANACONDA WIRE & CABLE COMPANY

GENERAL OFFICES: 25 BROADWAY, NEW YORK

CHICAGO OFFICE: 20 NORTH WACKER DRIVE

Sales Offices in Principal Cities

MANY MILLIONS of DOLLARS
are Spent each year
for **NEEDLESS**
TIMBER REPLACEMENTS

FOUNDED 1899
GRASELLI
REG. U.S. PAT. OFF.

MINE operators spend millions of dollars annually for mine timbers. A large part of this expenditure is for replacements due to rot. This tremendous waste can be avoided by the use of treated timber for all main workings.

Untreated timbers usually require replacement every 3 to 6 years. Zinc Chloride-treated timbers have been shown by numerous actual tests to be still sound and serviceable after 12 to 20 years exposure!

Zinc Chloride treatment adds but little to the cost of untreated timbers, yet it prolongs their life many times. It eliminates costly replacements and reduces maintenance expense. It is a wise economy to preserve mine timbers with Zinc Chloride.



Zinc Chloride-treated timber (marked 6) was installed in 1914 and is still sound today. Untreated timbers on both sides have been replaced several times during this period.



Send coupon below for illustrated booklet "Looking Ahead Twenty Years" sent free on request.

Zinc Chloride-treated timbers not only have longer life, but they are fire-retarding as well—thus insuring an additional factor of safety.

The GRASELLI CHEMICAL Co.
629 Euclid Avenue Incorporated Cleveland, Ohio

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NEW YORK, N. Y.



3500 Grays Ferry Road
PHILADELPHIA, PA.

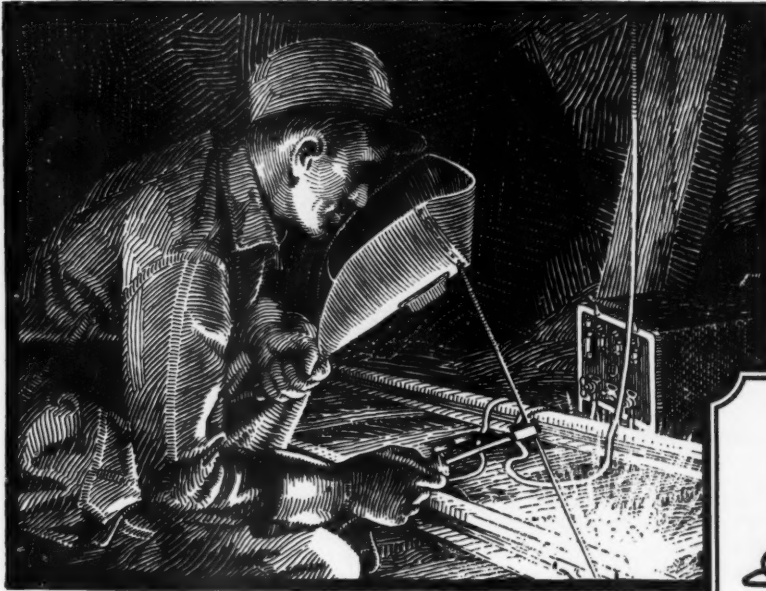
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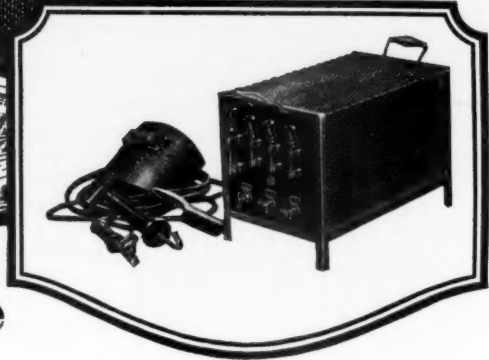
Please send me, without cost or obligation, your booklet "Looking Ahead Twenty Years in Wood Utility."

Name
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Address
City

Z GRASELLI INC CHLORIDE
A Positive Preventive of DECAY in Mine Timbers



**KEEPING
DOLLARS
FROM
WAITING
ON DIMES**



What the Profit-Wise Man Will Do

IN HIS plan of using better rail bonds and the proper welding rod to "keep dollars from waiting on dimes", the profit-wise mining man will not over-look the advantages to be gained through using a good welding machine.

A good welding machine enables the welder to control the welding current effectively, and enables him to make more good welds per hour of work. Welders, wise in the ways of good bonding, select the O-B Lightweight Welder for their work. This machine weighs only 55 lbs., and can be handled easily by one man. It has ample current capacity, and operates with thoroughness on voltages ranging from 175 to 275 volts. Current regulation is simple. Three single-pole knife switches give a choice of welding current from 30 to 210 amperes. Heavy nickel-chromium resistance wire and special insulating features put repair and replacement bills out of the immediate future into a time long after the machine has paid for itself.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1241M

Small But Mighty

The O-B Lightweight Welder is small, easy to handle, but it is mighty enough for the hardest bonding work. Unit construction plus a special arrangement of insulators and coils keeps the coils from grounding. Fully described, page 84, O-B New Products Supplement No. 4.



NEW PRODUCTS Supplement No. 4

Ten new money-saving mining devices are shown in this new O-B Catalog Supplement. Are you familiar with these? Leaf through this booklet frequently. You will find it well worth the time.

Ohio Brass Co.

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PORCELAIN
INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING
MATERIALS
VALVES

Use GELEX

to reduce your blasting costs

Gelex No. 1 • Gelex No. 2 • Gelex A

These du Pont dynamites have already reduced blasting costs in mining iron, lead, zinc, molybdenum, limestone, gypsum and clay.

In quarrying limestone, granite and trap rock.

In excavating for railroad and bridge construction.

And in driving railroad and sewer tunnels.

DYNAMITES of the Gelex type are designed expressly to decrease the cost of blasting in work that has been done heretofore with ammonia gelatin ranging from 35 to 60 per cent strength or with 40 to 60 per cent high-density ammonia dynamite.

They will not give as good results as these older explosives in every operation—much depends upon local conditions—but Gelex has lowered costs in many operations.

Gelex No. 1 and Gelex No. 2 stand between low-density ammonia dynamite and gelatin dynamite—more cohesive and much more water-resisting than ammonia dynamite but bulkier than gelatin. Gelex No. 1 averages 105 cartridges, $1\frac{1}{4}$ by 8 inches, to the 50-pound case; Gelex No. 2 averages 120 cartridges. No. 1 has a bulk, or cartridge, strength of 60 per cent; No. 2 of 45 per cent. Both are adapted for underground as well as open work.

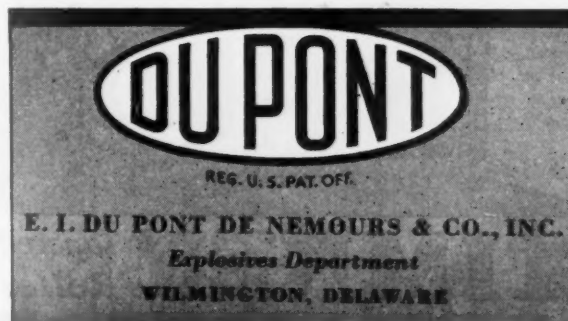
Gelex No. 1 has thus far found its chief usefulness in well-drill holes in limestone quarries.

Gelex No. 2 has been most successful as top load in well-drill holes in quarrying; as

entire load in well-drill holes for excavating shale; in smaller diameter holes in bench or low face limestone and gypsum quarries; and in limestone, gypsum, clay, lead, zinc and iron mines.

Gelex A has much the same characteristics as 60 per cent ammonia gelatin but is of slightly lower velocity and lower density, averaging 99 cartridges, $1\frac{1}{4}$ by 8 inches, to the 50-pound case. It is plastic and water-resisting and gives off a relatively small volume of harmful fumes. Gelex A has proved an efficient substitute for 60 per cent ammonia gelatin for blasting limestone, granite and trap rock; in quarrying and in excavating for construction work; for driving tunnels in sandstone and limestone; and for mining iron ore. At present this explosive is offered for sale only east of the Rocky Mountains.

If you think Gelex is adapted to your mining, quarrying or contracting requirements, tell us the conditions. Our extensive experiences may enable us to apply Gelex as a means to solve your problems.



"In view of the experience we have had in the building of thousands of Timken-equipped cars in the last ten years, we unhesitatingly recommend and design Timken Roller Bearings in our cars"

*Irwin Foundry & Mine Car Company,
Chester G. Sensenich, Vice Pres. and Chief Engr.*

From the operator's point of view, Timken-equipped mine cars represent one of the best-paying investments in modern mining equipment because of their depreciating effect on haulage costs.

With Timkens in the journals, more loaded cars can be hauled per locomotive per trip; higher average speeds can be maintained; lubrication is reduced to a fraction of its former cost; axle wear is prevented; trucks are protected against thrust; wheel breakage is minimized; car life is lengthened and maintenance expense is cut to the bone. The Timken Roller Bearing Co., Canton, O.



TIMKEN *Tapered Roller* **BEARINGS**

The MINING CONGRESS JOURNAL

A Monthly Magazine—The Spokesman For The Mining Industry—
Published By The American Mining Congress

VOLUME 17

JUNE, 1931

No. 6

Editorials

A World Problem

FROM the dawn of history a great part of the people of the world have recognized gold and silver as measures of value and the common denominator of property transfers. For the last half century during which silver has been in various stages of demonetization, gold has been made the single standard of value and because of its limited supply the trend has been toward the use of credit money based upon the gold standard. At this time one-half of the world's peoples accept gold as the real yardstick of value and the other half is being forced to abandon the wealth composed of silver which it has been accumulating during the ages of the past. That part of the world's markets is unable to take the surplus of goods produced elsewhere and business depression follows.

This is not the only cause but it is a substantial influence in slowing the stream of commerce in the accumulations of goods without a market, in closing factories and increasing unemployment. It is to the interest of every civilized country to increase its markets in order that continuous operation and continuous employment of both capital and labor shall be made possible.

There is grave difference of opinion between those who believe the world's gold supply is sufficient for all purposes and those who believe that the credit money which world commerce has called into being has reached a danger point in that a continuing increase of credit money will produce dire results. Beyond a certain undetermined point, the issuance of currency based upon a shrinking gold foundation gets into the field of greenbackism and fiat money which all regard as a financial danger. Whether a money based upon a proper relation to the uniform supply of both gold and silver might not be agreed upon which would hamper both inflation and deflation and more nearly constitute a uniform yardstick for the measurement of world values, might well be the subject of a comprehensive worldwide inquiry. This inquiry might well consider whether it is possible to equitably distribute the world's gold among the various nations giving to each a pro-rata supply as the basis of its currency medium.

All countries are increasing their commercial activities or endeavoring to do so and the success or failure of these endeavors measures the limit to the growth of markets, the expansion of which is so important for the increased production which must follow normal employment of our productive machinery. There seems

to be no possible method by which gold can be put in equal distribution. It seems plain that a pro-rata division of our present supply of gold among the nations of the world would so weaken the foundation of credit monies in our more prosperous countries as to require a contraction which would be disastrous to business enterprises.

This problem is a world problem. No single nation can furnish a solution. It is a moral problem in that its solution will make for the development of a higher civilization throughout the world and increase the luxuries available to many people who now have only the necessities, provide necessities to many people who have now only the means of bare existence and prevent suffering and the loss of life in some countries where many people die from starvation every year. To allow these conditions to continue is not creditable to any of the civilized nations of the world.

To avert these conditions is a world problem.

Modernized Mining

THE impetus given to the cause of modernized mining by the recent convention at Cincinnati is very gratifying after the long years of effort which have been devoted to stimulating this interest. The criticism is sometimes made that the only result of mechanization is to reduce the hand labor required and that in these times every effort should be made to increase employment.

This criticism applies to all use of mechanical devices. Shall we go back to the conditions when the transportation of our requirements were borne on the backs of human beings; to the ox team and sledge boat; to the ox team and the wagon which was a marvelous development of the age which produced it with its wooden bearings lubricated from "the tar bucket on the hind axle." Step by step, increased mechanical efficiency has led the advance in civilization. It would be interesting to know to what particular period of the past the critics of modernized mining would have us return.

Every improvement thus far has made for better conditions for the wage earner. The men who are displaced by mining machines will be more than absorbed by the increased enterprises based on cheaper power, which, because of lower production costs, will be able to reach wider and still wider markets and to furnish cheaper and still cheaper supplies to the worker, thus expand the purchasing power of his wage dollar.

World Attention to Silver

1896 political campaign the question of bimetallism was the national question, the consideration of which ran to every corner of this country, but other countries were not interested and did not consider the matter other than as a national political issue. Today the civilized world is everywhere giving consideration and thought to the position of silver. People everywhere are wondering whether the world's monetary gold supply of eleven billion dollars is a sufficient base for the support of a proper currency medium for all of the world's industrial enterprises. The fall in silver prices during the last year reduced by more than one half the wealth of more than half the peoples of the world. This reduced purchasing power had the immediate effect of damming up the flow of goods in world commerce. An industrial world equipped to supply the needs of these peoples found itself unable to stop its operations in time to prevent a vast over-supply of goods of every description.

The Executive Committee of the International Chamber of Commerce, at its headquarters in Paris, on February 20, 1931, recognized the "deplorable effect of the value in the price of silver on the economic situation of China, and the subsequent reduction of Chinese purchasing power at a time when too many other factors are exerting an unfavorable influence on international trade, and strongly recommends to all governments * * * to enter into immediate conversations with a view to adopting the concerted or individual measures which can be taken to master fluctuation and to maintain silver in the future on as stable a level as may be possible." The Chamber of Commerce of the United States, at its meeting in Atlantic City, April 30-May 1, 1931, adopted the following resolution:

STABILITY IN the monetary systems of the countries of the world is essential to freedom in international trade relations and to development of prosperous conditions within each country. Stability in the price of silver is consequently of great importance to the welfare of silver-using countries as well as silver-producing countries, and to the nations with which they maintain trade relations. The problems which have been caused by the decline in the silver price, and by its fluctuations, are accordingly particularly appropriate for development and study by an international business men's organization such as the International Chamber of Commerce. We accordingly urge that the International Chamber of Commerce should as one of its important activities continue and develop the interest it has already shown in the problems caused by the price of silver, to the end that it may as quickly as possible bring to bear upon these problems an international business judgment.

The International Chamber of Commerce at its sixth session held in Washington, D. C., reaffirmed the action previously taken by its executive committee in the following resolution:

"The International Chamber of Commerce realizing the serious consequences of the present silver situation to the economic condition of the world considers the convocation during the current year of a conference at which all interested bodies may be heard, for the purpose of seeking a solution to the problem, to be eminently desirable, and urges the national committees to bring the matter to the attention of their respective governments."

High Wages and the Tariff

capita than that of any other country. This condition is brought about largely because of our policy to pay the highest wage scale paid to workmen of any country and is founded upon the belief that the larger the earning power of any people, the greater the amount available for the purchase of goods and the larger the consumption.

Notwithstanding our high wage scale, our genius for organization, mass production has opened foreign markets, and while our imports of foreign-made goods have been upon an enormous scale, there has generally been a balance of trade in our favor. Our high wage scales have necessitated higher price levels than exist generally throughout the world. To protect these high wages and the attending high price levels, tariff duties have been assessed, covering as nearly as scientific investigation can determine, the difference in cost of production here and abroad.

At the present time, much criticism has been directed to this system because under it enormous industries and gigantic fortunes have been developed. No one disputes these facts; yet, as a rule, these fortunes, developed behind our tariff walls, have been so invested as to create new industries, which in turn employ more workmen and at a higher wage scale than is prevalent in other countries. It is well to remember that idle money earns nothing for its owner, and to secure an earning it must be invested either directly or through large financial corporations who loan it to those willing to take the risks of business. Great wealth in itself is not a cause for alarm. The maintaining of the high level of American wages is a question of grave concern.

A Glutton for Punishment

that taxation is a real method to accomplish the desired result.

Heavy taxation was advocated before the War Policies Commission, by William Green, president of the American Federation of Labor, as the best means of taking the profits out of war. Mr. Green opposed conscription of capital and said that the "only practical way to prevent profiteering is to recapture excessive earnings through heavy war profits taxes." He advocated some control of prices but opposed the Baruch proposal to "freeze all prices at the outbreak of a conflict."

Simply as a war measure, the proposal may be sound enough. But in peace time, a special effort should be made to keep taxes at a minimum; to see that all industries are accorded the fairest measure of taxation; and that there is no unjust discrimination.

As a point in interest, it might be well to consider the plight of coal, in relation to oil and gas, and the tax burdens of these industries. Does it mean nothing that as a peace time measure natural gas receives eight times the depletion deduction allowed coal?

If coal remains inert and fails to recognize the situation as it now exists, who will predict the future of that great industry and what measure of consideration would it receive, or be entitled to, in case of war and severe rates of taxation?

NOTWITHSTANDING

the present business depression, the United States is still the world's great market. Our consumption is greater per

MUCH publicity has attended the recent discussions upon how to take the profits out of war. Press releases carried headlines which indicated

Oil Stabilization

THE Federal Oil Conservation Board has approved recommendations of an Oil States Advisory Committee, appointed by the Governors of 10 states, for stabilization of the oil industry through an interstate agreement to curtail production and promote conservation measures. The plan contemplates approval of the conservation measures by the legislatures of oil producing states and by Congress, and is designed to overcome the "present dire conditions of chaos and distress existing in the oil industry." The essence of the plan is for the states to coordinate curtailment programs in order to prevent the waste of oil, abandonment of wells, monopoly by large companies, and to preserve the independent oil producing areas of the country. "Limitations on unnecessary drilling, conservation of gas energy, encouragement of unit development, ratable production within a given field and equitable apportionment of the outlet of the various fields" are to be the objectives of laws to be sought in the various states. Uniform state laws for conserving oil and gas underground and their effective enforcement are also to be sought. The committee also favored "equalization of the rate of foreign importation, with due consideration for pro-rata by domestic producers" and "to curtail imports and safeguard the country's balance in exports."

Summarizing the objects desired, the committee said: "Sound and uniform conservation laws within the states, coordination of their enforcement and effect with those of other states, balancing of their joint effect against foreign production, under a system which will be stable for long periods to enable economic production expenditures and flexible enough to meet changing conditions should be placed on a permanent basis by an agreement between the oil producing states which will retain for each state its own administration of its own resources and guarantee harmonious administration and cooperation through an interstate advisory board."

The board approved a recommendation of the committee that it continue to make, through its committee on economics, periodic examinations into the status of the oil industry and formulate national and regional forecasts of supply and demand, for consideration by the interstate committee and state conservation bodies.

This action may result in a new day for the natural resource industries, all of which are afflicted with oil's major ailment—overproduction.

Maintaining Markets

THE United States must sell in foreign markets more than 10 percent of its total production in order to maintain complete employment of its productive forces—labor and capital. Increasing efficiency of production only leads to overproduction without increasing home markets or expanding our foreign trade.

Today, our earning power has decreased, and our consumptive power has decreased in the same ratio. Our foreign markets have been severely affected by the worldwide depression, and there is little chance of expansion in that quarter. However, expansion of home and foreign markets is essential to world-prosperity.

The Far East countries offer a veritable garden spot for the increase in foreign trade. These countries, whose wealth is largely, if not entirely, in the form of silver,

have found that the necessities and comforts to which they have been accustomed are almost double the price of a year or two ago, and that they are therefore unable to acquire them. This situation precludes any possibility of the sale of luxuries to these countries.

If American business can devise ways and means of furnishing comforts and even luxuries to those countries whose wealth has been materially reduced because of the decline in the price of silver, the problem of the sale of our 10 percent will be simple.

Alaskan Minerals

AT LAST Alaskan coal gets a break. The Interior Department announces that the investigation of mineral resources along the Alaskan Railroad authorized at the recent session of Congress under an appropriation of \$250,000 will be carried on by the Geological Survey and will commence with an examination of the anthracite ridge coal field where there are known veins more than 50 feet thick. The investigation will include detailed surface surveys, test pitting, trenching, and sub-surface core drilling to the extent of 4,000 feet. The surface investigation of the anthracite field will cost \$27,000 and the core drilling \$100,000. The anthracite area has been temporarily withdrawn from classification but other areas to be investigated will not be withdrawn or reserved where the surveys will be carried on in the most promising areas, both on public lands and with the permission of the owners on claims which are already staked. No development work will be done but the testing of samples and intensive geological work will give the owners, prospectors and prospective investors some guide as to the possibilities of the property under study. The survey will also examine reported new prospects, re-examine non-mineral bearing areas with special references to quantitative determination of possible mineral tonnage, and record all known mines and prospects within the railroad belt.

These coal fields have been the cause of much difficulty involving bankruptcy and litigation over a period of years. The history of their development is closely allied with our political history. The plan of the Government just announced, while of little assistance to those who lost large and small fortunes in their development, should be of assistance to Alaska.

See Russia and Die Laughing

PRESS dispatches from Berlin report the expulsion from Russia of Mr. Wm. H. Grady, a consulting engineer of New York, and his wife, because Mrs. Grady had written for publication in an American magazine a joke concerning Premier Stalin. What would happen in this country if the half million communist foreigners who are here stirring up dissension and advocating the destruction of our Government should receive treatment comparatively as severe as the expulsion from Russia of these two Americans, the one of whom was there to design for the Soviet Government a model American anthracite mine.

The rage of the progressives would sound to high heaven if a Russian in this country should be expelled for offenses a thousand times greater than that embodied in Mrs. Grady's article, "See Russia and Die Laughing" from which the above quotation was taken.

The Federal Budget Situation

By

Hon. Ogden L. Mills*



FOR the fiscal year 1931 the United States Treasury will show the first deficit since 1919, the year in which war financing reached its peak. In the intervening period revenues have each year shown a surplus over expenditures; marked progress has been made in the reduction of the public debt; expenditures have been reduced from inflated war levels; and the burden of taxes has been greatly diminished, although without a corresponding reduction in revenue. At present we are confronted with the relatively new experience of marked increases in current expenditures attended by a sharp decline in revenues, and with the prospect of a very large deficit.

The change is so abrupt that it is well to re-examine our present situation and future prospects in the light of the experience of the past few years and from the standpoint of the course which normal expenditures and normal revenue may follow during the next few years. We have seen a tax system which produced some \$672,000,000 in 1914 expanded to produce \$5,728,000,000 in 1920, the peak year of war levies, and subsequently contracted through four continuing revisions and one temporary reduction.

There is nothing extraordinary in all this, for invariably our experience with wars has been that the expenditures of the Federal Government mount sharply to a peak either during or shortly after the period of war activity; subsequently expenditures decline, but not to the pre-war level, owing partly to continuing expenditures due to war activities, such as the service on the public debt, outlays

for military establishments on an increased scale and the care of war veterans. Also expansion in the civil functions of the government is accelerated during war periods, as compared with the gradual increase in normal peacetime.

The extent to which Federal financial operations are distorted from normal trends by wars may be amply illustrated from the record of Federal expenditures. The average yearly expenditures of the Federal Government for the decade 1810-1819, which includes the War of 1812, were 145 percent larger than for the preceding decade. From that high level expenditures for the period 1820-1829 showed a considerable decline but the average yearly figure for this decade was still about 76 percent larger than for the decade preceding the war; subsequently, between the decades 1820-1829 and 1830-1839 there was an increase of 43 percent. During the Civil War, the increase was of course more marked as compared with the preceding period, due to the nature and duration of that conflict. Average yearly expenditures for the decade 1860-1869 were 775 percent greater than for the preceding 10-year period. During the years 1870-1879 there was a decline of only 46 percent from the high level of the preceding 10 years, and this was followed by a decrease of 4,

and increases of 48 and 46 percent, respectively, during the three following decades ending 1909. During and after the Great War, we experienced even broader changes. Average yearly expenditures for the fiscal years 1917-1919 were more than 15 times as large as for the five years preceding 1915, and for the decade 1920-1929 showed a decline of 66 percent.

The significant fact to be noted is that each war marks the beginning of a permanently higher basis of expenditures, even after the war and early post-war peaks have been passed.

Let us now consider briefly the major facts pertaining to present Federal expenditures. Expenditures in 1930 amounted \$3,994,000,000, and for this year are estimated at \$4,435,000,000. The composition of these figures clearly indicates that the war continues to influence our budgets. Of total expenditures for 1930 about a billion and a half, or nearly 40 percent, represented disbursements that may be classified as related directly or indirectly to the military functions of the Government. This item in turn includes about 835 million for military pensions and the like, a class of expenditures which will not only continue for a considerable period of years but will inevitably increase as time goes on. Another major item in the budget for the fiscal year 1930 which may be attributed in the main to the war is the service on the public debt, including interest and sinking fund retirements totaling about \$1,050,000,000. This is also a type of expenditure which will continue, that is, until the debt has been extinguished. These two items account for nearly two-thirds of total expenditures chargeable against ordinary receipts for the fiscal year 1930. The remaining expenditures represent largely the ordinary costs of Government. In the present fiscal year present expenditures include a number of unusual and temporary items. These include disbursements under the agricultural marketing Act of June, 1929, and under more recent legislation providing for emergency loans for agricultural relief, as well as expenditures resulting from expansion and acceleration in governmental construction activity. A statement recently issued by the President indicates that at the present rate the cost of all governmental construction work represents a large increase over the rate of such expenditures previous to the depression. Although it is anticipated that most of these expenditures will continue, some on a larger and some on a smaller scale, in 1932, clearly both the new expenditures and the acceleration of others involved in the emergency program do not constitute permanent increases in the burden on the budget.

* Under Secretary of the Treasury.
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Viewing expenditures as a whole, while a decrease may be expected under some heads, it is hardly likely, even after eliminating temporary and extraordinary items, that any reduction under the average of the last few years is to be anticipated. On the contrary, the normal trend of government expenditures is upward. The annual average of expenditures for the eight years ending June 30, 1930, has been \$3,662,000,000.

Turning now to the revenue side of the picture, there are two obvious methods of financing the peaks of war expenditures—one by increasing tax levies, the other by borrowing. Usually both methods are employed, but there was a marked difference during the recent war period, as compared with the Civil War years. We financed a relatively large proportion of the expenditures of the last war through tax levies made during the war period. Taxes were levied in great number, promptly and effectively. Tax receipts during the Civil War totaled about 20 percent of the expenditures, whereas during the fiscal years 1917-1919 tax receipts amounted to about 27 percent of the total ordinary expenditures, a proportion which reflects very prompt action for such a short emergency. This was an unusual record in war financing, but the point with which we are particularly concerned in this discussion is that, because we built up a tax system to carry currently a relatively large proportion of the cost of the war, we were thereby faced with a correspondingly serious problem at the end of the war of revising this tax system to a peacetime basis.

It has been the aim of the Treasury in recommending tax legislation during the early post-war period to retain that part of the war revenue system which would further the development of a sound and effective tax structure to finance the Government over a period of years. The greater proportion of the taxes levied during the war were suitable only for emergency purposes and were levied with the single purpose of obtaining as much revenue as possible, with little regard for other consequences of the levies. To meet the existing emergency was the major consideration in comparison with which the type of the tax, the method of administration and the convenience of the taxpayer were secondary considerations. Also no one questioned whether the taxes could be adapted easily to changes in the fiscal requirements of the Government over a period of years.

The number and rates of taxes to meet the war emergency reached their maximum in the revenue Act of 1918. Under this act single individuals with incomes of \$1,000 and over and married individuals with incomes of \$2,000 and

over were taxed at rates which were graduated upward in rough proportion to the size of the income and ranged as high as 65 percent surtax and 12 percent normal tax on amounts of income in excess of \$1,000,000.

In addition, consumers, rich and poor, paid taxes on a great variety of goods and services; and in levying many even of these indirect taxes an effort was made, and with considerable success, to impose the heavier burden upon the wealthy. Tobacco taxes were increased some 50 percent; on admissions to places of amusement 1 cent was paid to the Government for every 10 cents. Those who traveled paid taxes on railway tickets and reservations. Telephone calls and telegrams were taxed, and other taxes were levied on products as they left the hands of the manufacturer or dealer, and were, at least in part, added to prices paid by the consumer. Thus individuals made contributions to the Government in the purchases of automobiles, tires and accessories, candy, chewing gum, drinks, photographic supplies, musical instruments, jewelry, perfumery, cosmetics and medicinal articles. The burden of these indirect taxes was distributed fairly generally; other taxes, such as those on the estates of decedents, club dues and a variety of consumption articles, such as sporting goods, firearms, yachts, motor boats, hunting garments, articles made of fur, and other wearing apparel, bore more heavily upon individuals with relatively large incomes.

There were other taxes which reached the individual as a business man through the income and war and excess profits taxes, the tax on corporation capital stock, stamp taxes on documents and the special occupational taxes.

After the close of the war these taxes were gradually revised and reduced mainly through four revenue acts—those of 1921, 1924, 1926 and 1928—until finally the elaborate wartime system of numerous, and in many cases cumbersome, taxes on commodities and activities—some yielding a comparatively insignificant amount of revenue—has been changed into an internal revenue system of comparatively few taxes. Individual incomes have been relieved through three continuing and one temporary reduction in normal rates, three reductions in surtaxes, a special rate for income from sale of capital's assets, increases in personal exemptions and credit, and the addition of a credit for earned income. The war and excess profits taxes on corporations have been removed. A substantial reduction has been made in estate taxes. The excise taxes on the sale price of a long list of articles, ranging from toilet articles and jewelry to automobiles and sporting goods, has been virtually eliminated.

The special taxes included for corporation capital stock and a variety of occupational taxes have all been repealed except the tax on brewers and distillers and on the use of narcotics. Some reduction has been made in the tax on documentary stamps, admissions, dues, distilled spirits and tobacco products. Taxes on transportation, on telephone and telegraph, on insurance and on non-alcoholic beverages have been repealed.

In considering the present situation in regard to revenues I am inclined to take as a point of departure the fact that during the past decade, despite reductions in taxes, revenues have been fairly constant at relatively high levels, although considerably below the peak reached early in the post-war period. Ordinary receipts have continued close to the annual average of \$4,018,000,000 for the past eight years. This result is to be accounted for largely by the relatively high level of business activity and generally prosperous conditions which prevailed during the period, and in part by the increased productivity of taxes which followed upon the elimination of the extremely high rates of the war period. It should be observed, however, that in considerable measure the revenues of the period were considerably influenced by certain classes of receipts not of permanent character. The immediate post-war years are somewhat confused by numerous special items, both of receipts and expenditures, which appeared during that period of broad readjustments. The significance of non-recurring elements in Federal receipts of past years may be readily indicated, however, by reference to the period beginning with the fiscal year 1923. From 1923 to 1928, inclusive, the net proceeds of sales of securities of the Federal Government amounted to \$642,000,000 and the proceeds of sales of war materials to about \$166,000,000, at the same time \$254,000,000 was realized from the liquidation of the War Finance Corporation. Receipts from these three sources, aggregating \$1,062,000,000 for the period, have now become negligible; they amounted to only \$18,000,000 and \$17,000,000 for 1929 and 1930, respectively. A somewhat similar influence has been exerted on receipts of certain years by the collection of back taxes. Although it is impossible accurately to measure the amount by which receipts have been affected by non-recurring items, it can be said that as much as half of the combined surplus of about \$2,800,000,000 for the past eight fiscal years may be attributed to such receipts.

The post-war tax system evolved out of our war experience differs materially from the pre-war days. Then our revenues were derived primarily from customs and other indirect taxes, chiefly

taxes on tobacco products, distilled spirits, and fermented liquors. Customs produced about half of the tax receipts, and the above taxes largely accounted for the remainder of the pre-war receipts. Now about two-thirds of the taxes come from income taxes on corporations and individuals. Tobacco taxes continue to yield large revenues and except for income taxes are the most important source of internal revenue. Customs, also, still yield substantial receipts. Distilled spirits and fermented liquors are now, of course, a negligible source of revenue.

The current situation forces us to scrutinize carefully our new post-war tax system. Receipts have declined seriously with the business depression. We are faced with a large deficit. Does this mean that taxes have been reduced too far or that the taxes that have been retained do not constitute a sufficiently well-balanced system to provide an even flow of revenue from year to year? History indicates plainly enough that while during the first few years succeeding a war expenditures may be rapidly reduced from the war level, they never return to the pre-war level, but remain on a substantially higher basis. It is impossible, therefore, to hope to return to the comparatively simple system that existed before the World War. It would be entirely inadequate to meet present or future needs. These are so vastly greater that what is required is a modification of the war system of taxation rather than an expansion and development of our pre-war system. Wars do permit the imposition of taxes which however sound could never be imposed as new taxes in peace time. It is the part of wisdom to retain some of them, at least, after a war is over.

Our present situation raises the question, though it does not do more than raise the question, as to whether some of the taxes developed in the war period have been repealed or modified perhaps a little too rapidly. Through successive revisions in the income tax laws, personal exemptions and credits have been increased, and the income base, which bears the major direct burden of the individual income taxes, has been greatly narrowed. We have limited the incidence of the individual income tax to some 2,500,000 taxpayers, a comparatively small number compared to our total population, and of this number some 380,000 pay about 97 percent of the tax. Partly in consequence of this fact the amount of our revenue derived from income taxes is much more susceptible to sweeping changes than would otherwise be the case. Moreover, this susceptibility to change is emphasized by our treatment of capital gains and losses, which tend to swell abnormally the cur-

rent income in times of rising prices and expanding business, and to depress it to an even greater extent in periods of falling prices and business contraction. At the same time we must realize that the concept of capital gains as taxable income forms such an integral part of our income tax system that its elimination would be nothing short of revolutionary and would involve a pretty complete re-writing and re-interpretation of this complex law. Tobacco taxes are at present our most stable form of revenue, though customs duties may be relied on to produce relatively stable amounts except in truly abnormal times. But the fact that we rely for two-thirds of our tax revenue on the income tax and that that income tax is so constructed as to be extremely sensitive, makes our whole revenue system susceptible to very wide fluctuations, following in the main the curve of business peaks and depressions.

It is true that from 1924 onward we were able steadily to reduce rates and narrow the tax base, and still witness increasing income tax collections during most of the period, since business and the national income expanded more rapidly than taxes were reduced; and at the same time governmental expenditures remained comparatively stable. We know, furthermore, that our last revenue act, at least as it applied to income in 1928 and 1929, was adequate for our needs for the first two years it was in effect. But under the present conditions of extreme depression expenditures are exceeding revenues by a wide margin.

This would be a matter of very grave concern were it not for the fact that conditions are so abnormal that they do not furnish any fair test of the adequacy of a revenue system. On the one hand, expenditures are swelled by emergency needs, and on the other hand, revenues are depressed way below the normal point. Moreover, the current deficit appears less formidable when we realize that it includes some \$440,000,000 of public debt retirements so that the actual net increase in the public debt will be much less than the deficit figures themselves would seem to indicate. Undesirable as is any increase in the public debt in times of peace, we can feel less concerned about it than we ordinarily would because of the fact that during the last 10 years public debt retirements have been effective at a much more rapid rate than might have been expected. While, therefore, we are not justified in looking upon the present position of the Treasury with complacency, there is no occasion for alarm unless it should appear that there is a real danger of a series of unbalanced budgets.

This brings us to the question of what is to be expected from any revenue system. From a theoretical standpoint, it

may be argued that all we should aim at is a balanced budget over a relatively short period of years, the assumption being that if through a succession of surpluses in years of prosperity the finances of the Government have been greatly strengthened by public debt reductions, a sufficient margin of safety has been provided to meet successive deficits during lean years. From a practical standpoint, however, it seems to me that we should be guided by the sound principle of endeavoring to close each fiscal year with a balanced budget. While theoretically a series of surpluses might be applied to the strengthening of the financial structure, they are much more likely to be dissipated in increased expenditures, while if once we admit the propriety of a deficit, there is a real danger that we might come to view them with such complacency that we would shirk the disagreeable but essential duty of avoiding them either by reducing expenditures or increasing taxes. Insistence on a balanced budget is the one means that I know of compelling a government to live within its income and of making the people realize that if they desire to expand the services of government they must inevitably look to increased contributions in the form of taxes.

By a balanced budget I do not mean, of course, that it is possible to devise a system which would provide revenues in exact balance with current expenditures involved in the numerous and varied Federal activities. The achievement of such a precisely balanced budget would be a matter of the rarest accident. But I do mean that we should so adjust our tax system that year in and year out there will be no great variation between receipts and expenditures, and that a comparatively small deficit one year will be offset by a comparatively small surplus the next.

The establishment of such a system demands in the first place the determination, after eliminating the unusual items that now distort the picture, of what normal expenditures are likely to be for the next few years, allowing, of course, for the inevitable upward trend. The second essential step is to ascertain whether our present tax system, once business conditions have returned to normal, will be adequate to furnish the necessary receipts. The second problem is obviously an enormously difficult one under existing conditions, and while the Treasury Department is endeavoring to formulate some reasonable satisfactory answer, our final conclusion should be based on further trial and experience. Certainly the present year taken by itself offers a most inadequate criterion by which to judge the ability of the present Federal revenue system to meet the Government's normal requirements.

Constructive Industrial Development

IT IS a most genuine pleasure to be here and to have the privilege of presenting some thoughts on the subject of constructive industrial development. Personally I have been interested in this for a good many years, during the last four of which I have been engaged directly in efforts to cooperate with hundreds of communities served by member companies of the Middle West Utilities System. It is especially pleasing to appear on your program in Louisville, because here is the headquarters of the Kentucky Utilities Company, one of the finest constituent members of the organization with which I am connected. Its president, Mr. L. B. Herrington, has long been a leader in the development of the communities in the widespread territory which his company serves. And our good friend, Captain Watt, chairman of your board of governors, also has been exceedingly active along these constructive and helpful community lines. It may be said that we in the public utility field have a selfish interest in such activities. So does every man engaged in business. But it is broader than that—we want to be part of the communities in which we find ourselves and to help them in every possible way along constructive development lines.

As a matter of fact, the electrical industry is absolutely responsible for the diffusion of industry which the United States knows. Fifty years ago before this industry took form—20 years ago, before the time of high-tension lines and transmission and interconnection—the smaller town, no matter how advantageously it was situated otherwise, could not be much of an industrial community. It was simply impossible, because it had no certainty of electrical power, and industry would not subject itself to the breakdowns, the delays, the terrific cost that comes from an idle plant when there are orders on the books. So much for this rather personal phase.

It has been generally believed, and a recent authoritative investigation proves it to be true, that there is a trend toward decentralization; not a revolutionary trend—we know that is not true, because such a movement would be self-

evident—but there is certainly a trend toward the smaller community when it comes time to establish branch plants or to remove a plant. The Civic Development Committee of the National Electric Light Association, in conjunction with the Metropolitan Life Insurance Company, made a study of that very thing, a nation-wide study comprehensive enough and historically old enough to give those who are interested an idea as to what has actually been done in regard to the migration of industry. Included in that study are data as to the manufacturing companies which have been organized within communities, whether they have come as a result of community effort, whether the financing has come from outside or whether it is a combination of the two, together with various other fundamental facts, which is, as far as I know, the first time such a comprehensive study has been made. Others have been attempted, but with not anything like the degree of success which such research needs. Copies of the report are obtainable from either organization.

There is no question in the world that the problems of congestion as regards industry are many. We all know that. Those who have had anything whatever to do with industry or who have observed

By John B. Reynolds*



Mitchell Dam, Coosa River, Alabama

*Director, Industrial Development Middle West Utilities Company.
Presented to Southern Industrial Development Conference of the American Mining Congress, Louisville, Ky., March, 1931.

what is going on know it. It is a matter of general knowledge that some concerns have moved and are moving from the congested large cities into the suburbs or entirely away from those large communities.

However, in normal and natural industrial development, there is nothing of a struggle between the city and the small town. There are great advantages for both in such decentralization. Certain industries in their very nature need to remain in the cities. Others belong in the so-called satellite communities, while still others are best situated in the smaller cities and towns, and not necessarily near large aggregations of people. Whatever advantage large city location may bring industry, it can not be denied that production costs are increased materially by the traffic congestion, by higher wages and taxes, by necessarily larger capital investments and because of many other factors of varying degree and importance. Industry is thus benefited by a reduction of overhead and production costs. Workers are permitted to live in a normal atmosphere and without any disadvantages of congested, slum surroundings. Their children grow up in an atmosphere of brightness and culture not often found for them in cities. The large cities actually benefit by these removals because needed space for other industries is provided and weak and struggling industries are enabled to become much more prosperous in localities better suited to their needs. This increase in general prosperity is clearly reflected in the larger centers of the land. It goes without saying that the smaller towns to which industry is attracted are greatly benefited. The community pay roll is increased out of all proportion to the effect on a larger city; work is often supplied to women and girls who otherwise must remain unemployed. Property values are increased and tax income increased to the end that services which should be provided by the town to its citizens may be more easily rendered and without heavier taxation. Thus living conditions are advanced to higher standards and workers can provide themselves and their families with all necessities at living costs materially less than in the great centers of population. The future will undoubtedly see a continued increase in this trend of industry to decentralize.

Last, but not least, on this list is the efficiency of the workman. There is no doubt about that. A man who lives in the open spaces with plenty of elbow room, with a home and a garden plot of his own, is a better workman than the man who has to be content with the conditions which prevail in congested industrial communities. He has a better mental attitude towards life because of the social and educational advantages

which are his and which come to his family.

In the joint industrial survey mentioned, markets were given as the most important reason for relocation of plants, labor was second, and transportation next. Then followed a wide variety of reasons, with nearness to parent company and banking facilities at the end. One of the surprises of the survey was the really small percentage of removals and establishments of branch plants. Relocations accounted for 9.4 percent of the plants and 18.7 percent of the gain in employees. Branch plants were responsible for 8.8 percent of plant gain and 25 percent of total employees gained. The balance, almost 82 percent, was represented by new industries started within the communities reporting. When it is realized that nearly 2,000 communities reported and that over 10,000 plants, employing more than 371,000 workers, and that the report covered every section of the country, it will be seen that one of the most important phases of industrial development relates to purely local industries.

Before a community can hope to do much in the way of industrial development or expansion, it is absolutely necessary that it shall have an accurate and truthful survey of its industry as it exists, of its immediate raw materials, of its transportation facilities, of its tax rates, of its churches and schools and playgrounds, and of everything that goes to make up the community. It would be foolish for any community to undertake any widespread activity in the way of attempted industrial expansion unless it had had made or made itself a survey which can be studied, and, after study, used as a basis for steps which must be taken in order to accomplish the thoroughly to be desired purpose. Community surveys must be honest in their recognition of community disadvantages or shortcomings. It is not reasonable to expect prospective industries only to consider the favorable factors of our communities. They are looking for locations which will best suit their purpose, and we must approach the problem of location with a full realization of the fact that community liabilities must be removed or reduced to a minimum before a prospect can be interested. One of the greatest faults of the average survey is that it magnifies out of proportion the advantages and glosses over very glibly every disadvantage.

Some communities have foundations, so called, of one sort or another which are available to help industry which is already in existence or to help finance industry which is seeking a location. Some of them take the form of the Louisville (Ky.) Foundation, which is a stock subscription proposition where a million and some odd thousand dollars have ac-

tually been subscribed and paid in, and which operates very much as a bank does, except that it makes long-term loans on real estate, buildings and equipment, loans of a sort not possible for commercial banks to make. It lends on first mortgage only. It is represented on the boards of directors of various companies in which it has participated in financing, and it has an actual voice in the management of their affairs.

Then there is the so-called Easton (Pa.) plan, with which you may be familiar, where a certain number of business men or companies sign a contract with each other for limited liability of an amount mutually agreeable, then appointing attorneys in fact who have authority to endorse for the group at commercial banks; in that way getting the money that is necessary for industry, the money, of course, being advanced only to those meeting the requirements of this group or of the chamber of commerce with which it is affiliated. It is all done on a purely business basis and both plans have worked well.

One of the things that we can do for our communities is to advise them as to which particular industries to let alone. That is just as important as it is to advise them in an affirmative manner. One of the worst things which can happen to a town is to get an industry which has no chance from the outset of making a success, either because of bad location, or because of the fact that it is entering a market which is already overproduced, or because of the character or ability of the men involved, or underfinancing, or what not.

May I digress at this point to say a few words about chambers of commerce. I am exceedingly interested in these agencies of community service. The business men of a community can make the chamber of commerce of that community whatever they will that it shall be. This idea of sitting back and saying, "We won't have anything to do with it," is hardly the manner in which you meet your own problems in your own businesses. And the chamber of commerce is just as much your business—or almost as much—as is the business in which you are engaged day by day, because there is, as far as I know, no other agency anywhere that devotes its time 365 days a year to the general welfare of the community for which it is organized and which it tries to serve. Until there is a better medium of community cooperation, let us get behind the chamber of commerce and help it in its multitudinous duties, because it certainly does touch every single phase of community life—business, social, and family—and this business of dismissing it with a wave of the hand and saying, "It is no good," may be the easiest way, but it doesn't

get you anywhere. The Chamber of Commerce of the United States in Washington is an agency of service through which local chambers of commerce and business groups can work with the greatest advantage. It has a large and efficient staff of specialists, trained along various lines, and is ready and anxious at all times to add its counsel and give its guidance.

Some of the conclusions of a summary of the metropolitan report are very appropriate in a meeting of this nature. It states that: "The migration or the physical shifting of industry is not the factor in industrial growth which many thought. The real development has come from the establishment of new local industries and the setting up of branches in order to tune in on the marketing situation.

"No data were developed during the survey on the expansion of existing industries, yet, from the standpoint of economic growth, this represents just as real an increase in community wealth and opportunity for additional employment as relocations, branches, or new local industries. The reason for the failure to get these data was that communities did not collect it. "Enough emphasis has not been placed upon the analysis of losses of plants and comparatively little is being done in a definite, organized way to make new or previously existing industries in a community happy and prosperous, so that they want to stay. Yet substantial sums of money have been raised frequently and definitely organized movements initiated for the purpose of attracting industries from other cities. The real prosperity of a community depends upon stabilization, and the losses of industries tend to upset this condition. The large cities still receive most of the plants, but there is a strong tendency toward the establishment of relocated industries and branches in the smaller cities. About 40 percent of the net gain of all plants has been in these smaller cities.

"There is a definite need for pioneering effort to be continued on a systematic basis. The development and movement of industry so affects our social and economic growth, nationally and territorially, that some machinery is necessary to record what is taking place, yet no such machinery is in existence. It would seem that a neutral agency, such as the United States Department of Commerce, would be the logical body to carry on continuously this effort to know at all times how, why, and where industry is growing or moving.

"There is one observation which stands above all others in the survey—the greatest industrial development comes from self-development rather than from at-

tempting to attract industries from other communities."

It would be folly to pretend that the present business conditions have had no unfortunate effects. It is gratifying to realize, however, that because of leadership throughout the business world present conditions are much better than would otherwise have been the case. The manner in which this critical and potentially disastrous condition is being met is a living example of what cooperation can do. It accomplishes wonders under intelligent leadership such as you in this group are so fortunate as to have. Equally important as leadership is the willingness on the part of the rank and file to follow, to have faith and to work.

Recently in his message of veto in regard to Muscle Shoals legislation enacted by the Congress just adjourned, President Hoover used this sentence:

"The first essential of all business is competent management."

The President said a mouthful. Every industrial community, large or small, has the very serious problem of potentially important and successful industries which either are rapidly approaching failure or which are only moderately successful because of their lack of proper managerial ability. Most of these are industries which would be of much greater community value if adequate management could be added to their organizations. The situation presented is very difficult, because usually when these smaller industries are ready to ask for help it is too late for the service of anyone except a receiver or the undertaker. The best interest of our communities would be very greatly served if the local chambers of commerce could organize advisory groups composed of successful business and professional men and bankers to whom problems of management and finance of these weak industries might be referred for consideration, advise and help. Through the banks it should not be difficult to ascertain which industries in the community are wobbling and their own natural selfish interests should dictate a very com-

plete cooperation with such groups as I have informally mentioned.

It is necessary to be patient above all things in industrial development and to be an optimist of the most dyed-in-the-wool type. You may work for months on a prospect and think you have it landed, when, the first thing you know, another town gets it. But that is all in the game. Your competitor may have been working on one which you got. It is not fair to expect too much, certainly not in the shape of new industry, because, while industries move, there are not industries enough in the world to supply all the American communities which want industries, if every one of them got all they were asking for or expect.

I heard Gen. Leonard Wood several years ago, when he was seeking the nomination for the presidency, illustrate the fact that motion does not mean progress, by any means. He bore down pretty strongly on that, and I was very much impressed with what he said, "If you don't believe me, take the whirling dervish, for example. Nothing moves faster and no one is more worn out with his effort, but when he gets through he is exactly in the same place he started." As a young man—not so much younger, because I decline to recognize age—an old fellow for whom I worked in school vacation time, and who was probably the meanest man I ever knew, called me in and said, "Runnels," deliberately mispronouncing my name, "Runnels, you go so blankety-blank fast that you pass by more than you catch up with." And I find myself, as well as others, doing that once in a while now. I have always been glad that that mean old man said this to me, because it acts as a check. We all see people doing it, going too fast and not catching up with much of anything. But if we go slowly, if we give this thing the serious attention it deserves, if we make it a part of our program, if we tie-in, as to be successful we must, with others mutually interested and they with us—and go forward hopefully and expectantly—then we will have accomplished something in the lasting interest of our communities.



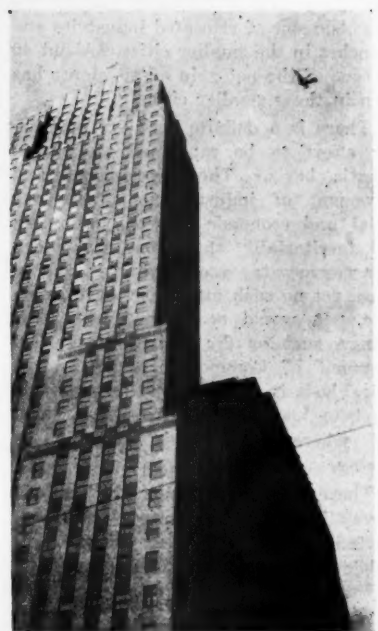
Below—Fountain Square in Cincinnati, showing the Gibson Hotel and Starrett's Netherland Plaza



Above—A glimpse of the exposition. North wing of the Music Hall

Upper right—Lobby of Music Hall, headquarters for the convention and exposition

Right—John C. Haddock, president of the Haddock Mining Company, arriving in Cincinnati for the convention in his Autogiro



With the Mining Congress Journal
photographers at Cincinnati



The COAL CONVENTION A GREAT SUCCESS

MAINTAINING the high standard set in previous years and with many new and attractive features, the eighth annual convention of practical coal operating officials and exposition of mining machinery, equipment and supplies held by the American Mining Congress at Cincinnati, Ohio, from May 11 to 15, received the hearty commendation of leaders in the coal industry and passes into history as one of the high water marks in the progressive development of the industry.

The proceedings of the week were marked by several features. There was manifested throughout an eagerness on the part of operating officials to learn everything possible about new and improved processes of mining and an alertness of the machinery manufacturers to meet the needs of the operating industry by the most improved types of machinery and equipment.

A delightful spirit of fellowship was evident in the mingling of coal operators and manufacturers and the social diversions provided during the convention were the medium of bringing the coal mining fraternity into a closer bond of friendship.

Notwithstanding the existence in the country of the most profound business depression in its history approximately 2,500 registered delegates were in attendance, divided among 1,450 operators and 1,050 manufacturers. Several of the speakers departed from the practical op-

erating end of the program to express optimistic views on an early recovery of business conditions and a brighter day for the coal industry.

Interest in the convention and exposition was maintained at a high pitch from the time the gavel was sounded by James F. Callbreath, secretary of the American Mining Congress, on Monday morning until he closed the convention Friday afternoon. While there were a few changes in the presiding officers of a number of the sessions, due to illness or other detaining cause, Secretary Callbreath was on hand at every session and all of the papers were read as scheduled, either by the authors or by a designated substitute.

Two enjoyable social occasions were enjoyed by the delegates, one a gypsy breakfast in honor of Robert E. Taggart, chairman of the Program Committee, on Wednesday morning at the Gibson Hotel, at which 75 invited guests were present, and the second, the annual dinner and entertainment held on Thursday evening in the Starrett's Netherlands Plaza ballroom.

Holding its annual election, the Manufacturers Division chose Charles C. Whaley, of the Myers-Whaley Co., of Knoxville, Tenn., as the new chairman of its board of governors and took under advisement for decision next December invitations from several cities for the 1932 convention, including Cincinnati, Columbus, Chicago, West Baden Springs, and Louisville.

At its annual session the National Committee on Mechanized Mining of the American Mining Congress, headed by Dr. L. E. Young, of the Pittsburgh Coal Co., received a message from the Department of Commerce to the effect that the coal industry can be looked upon "as a

laboratory serving business generally" through its modernization of mines by the mechanization process and that such mechanism "will lead to a more healthy future." A luncheon meeting was also held by this group.

At a meeting of a committee of the National Standardization Division of the American Mining Congress plans were perfected to further standardize and simplify mine track materials which it was said will operate to reduce stocks and provide economies in underground transportation costs.

OPENING SESSION

Secretary Callbreath, in opening the first session on the morning of May 11, felicitated the operators and manufacturers in cooperating to develop the program and the exposition. "We have a fine program and a fine exhibit," he said. "We were told earlier in the year that to attempt to conduct a convention this year was risky because of business conditions. If business generally had approached the field as we have, our hard times would be a thing of the past and we would be now looking to a continuation of the old-time prosperity which for so many years blessed every part of our nation. It is time that we gathered up our courage and that we moved straight ahead. We have in this country all the money, machinery and products that we ever had. All we lack is the confidence to move straight ahead. I do not say that the coal industry is the worst, but I do say that it does not occupy that position which it should, because of the fact that it deals with a necessity of all industrial life. It should be in a commanding position, instead of the reverse."

In assuming the chairmanship of the

opening session, Harry N. Taylor, of New York, chairman of the board and general manager of the United Electric Coal Companies, expressed an optimistic note for the future of the coal industry. "We should be giving more thought to our future," he said.

"I have faith in the mines. In the 48 years that I have been connected with them I have seen these times come and go. I have seen them even more desperate than they are today. In 1897 the coal industry was far more prostrated than it is today. No operator then could make a living and no miner could live at the wages offered. I look on this present situation more as an adjustment than a depression. If we will adjust ourselves in our selling as well as our mining methods and in our treatment of our employees, we can rehabilitate the coal industry."

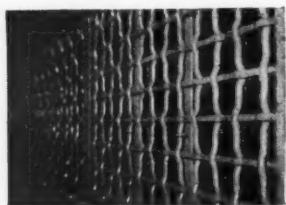
The honor of delivering the first paper to the convention fell to the lot of P. C. Thomas, first vice president of the Koppers Coal Company, who opened the session devoted to modern coal mine management. In speaking on "Trends Toward Better Management," Mr. Thomas analyzed conditions in the coal fields of the country, based on replies to a questionnaire sent out by him to 25 leading companies. "The purpose is to mine better coal, uniformly clean and prepared for the market with a minimum of accidents to employees and at the lowest possible cost, treating the employees well and keeping the mines in the best physical condition," said Mr. Thomas, in summarizing the data. Discussion of this paper was participated in by T. R. Johns, of the Bethlehem Mines Corporation; R. L. Ireland, Jr., of the Hanna Coal Co.; Paul Weir, of the Bell & Zoller Coal & Mining Co.; G. C. Davis, of the Phelps Dodge Corporation, and I. N. Bayless, of the Union Pacific Coal Co.

The concluding speaker of the morning session was B. H. McCrackin, of Fairmont, W. Va., maintenance engineer of the Consolidation Coal Company, who spoke on "Budgeting Repair Costs," in which he outlined methods to control the expenditures necessary to keep in good operating condition all mechanical and electrical equipment, exclusive of mine tracks, etc.

"Some of us have seen harder times than we have recently passed through," said P. M. Snyder, of Mt. Hope, W. Va., president of the C. C. B. Smokeless Coal Co., in opening Monday afternoon's session devoted to safe operating practices. "We will not make much headway by

talking hard times. Wherever there is a will there is a way. I have no doubt that the coal industry will come back like it always has in the past. We produce in this country almost half the coal output of the world. We have the high-

est grade of coal, and notwithstanding we pay higher wages than mines in foreign countries, we are producing coal cheaper than they. Let us not do anything in this temporary situation that will react unfavorably upon us in the future. Coal is a basic fuel and if we do nothing irrational we will be in better shape later."



Not the Cincinnati jail—just an unusual view of a section of shaker screen

MAINTAINING DISCIPLINE

Thomas G. Fear, also of West Virginia, general manager of operations of the Consolidation Coal Co., began the session with an interesting paper on "Maintaining Discipline," in which he pointed out that fair and impartial enforcement of discipline among the working and supervisory forces in mines is necessary to assure safety in their operation. "Discipline is one of the fundamentals of our civilization," he said. Those participating in a discussion of this paper were John H. Richards, chief mining engineer of the Wheeling and Lake Erie Coal Co.; I. N. Bayless; W. M. Lacey, general superintendent of the eastern division of the DeBardeleben Coal Corporation, of Alabama; Edgar C. Weichel, assistant general manager of the Hudson Coal Co.; W. H. Lesser, of the Penn Anthracite Mining Co., of Scranton, and Mr. Davis, of the Phelps Dodge Corporation.

"There is no job at the Nellis mine at which a man has to get hurt," was the outstanding statement in the paper of Charles W. Connor, of Nellis, W. Va., superintendent of mines of the American Rolling Mill Co., operated at that place, his subject being the "Safety Program at Armco," records, methods of enforcement, etc. Discussion of this paper was participated in by Mr. Fear.

MINING SYSTEMS

Mining systems in various parts of the country were described in papers at the morning session on May 12, presided over by R. L. Ireland, Jr., of Cleveland, vice president of the Hanna Coal Co., in the absence of Robert J. Smith, of the Princeton Mining Co., of Terre Haute, who telegraphed the convention that he was ill and en route to Battle Creek, Mich., for treatment. "The coal business is no longer merely a producing proposition, but a manufacturing proc-

ess," said Mr. Ireland, in assuming the chair. A paper on Pennsylvania mining systems prepared by M. D. Cooper, division general superintendent of the Hillman Coal & Coke Co., of Pittsburgh, was read by Mr. Thomas, in the unavoidable absence of Mr. Cooper. In describing the four typical systems in present use, Mr. Cooper's paper pointed out that mining plans are now being laid out with greater attention to future retreat operations rather than to immediate questions of the size of pillars for proper roof support.

Speaking on mining systems in Illinois and Indiana, I. D. Marsh, of Belleville, superintendent of the Alcoa Ore Co., said the "most popular and widespread method of mining in this territory is the panel system."

A paper on the Hamilton Mine of the Tennessee Coal, Iron and Railroad Company, by Robert Hamilton, consulting engineer to the company, described operations in a coal field near Birmingham, Ala., containing 30,000,000 tons of coal, and the washing plant of the company designed to prepare 320 tons of coal per hour, the maximum capacity of the mine.

George A. Murphy, superintendent of the Spring Canyon Coal Co., of Utah, read a paper on "Mining Systems in Utah," prepared by George A. Schultz, general superintendent of the Liberty Fuel Co., which pointed out that these fields presented difficulties to systematic mining due to the tremendous overburden, thick seams, and highly explosive coal beds.

The concluding speaker at this session was G. E. Nettels, of Pittsburg, Kans., who in describing strip mining operations in the southwestern coal fields, said that efficiency must be exercised if strip mining is to continue profitable.

MECHANICAL MINING IN THICK SEAMS

Thomas T. Brewster, of St. Louis, president and general manager of the Mt. Olive and Staunton Coal Co., presided at the afternoon session on May 12, when papers were received by the convention on mechanical mining operations in thick seams. "I always have done what I could for the benefit of the coal industry, and shall continue to do so, no matter how hopeless our outlook may be," he said.

The first paper at this session was by A. J. Ruffini, efficiency engineer of the Wheeling Township Coal Mining Co., of Adena, who described the development by the company of a semi-automatic lubrication system for mechanical coal loaders. The system was designed by E. J. Christy, an official of the company. This matter was discussed by Mr. Foster, of the New Orient mine, who said the same system was employed for lubricating machines used in that mine, and that the system was efficient.

In a paper on the "Gathering System With Mechanical Mining," C. J. Sandoe, vice president of the West Virginia Coal Co., of Missouri, said improved processes of coal mining require the training of the mine mule. "In the gathering operations, animals as well as men operating the cars must be trained," he said. "The mules have to become accustomed to making short pulls and stopping, and to do it rapidly. They can be trained to do it, and the men also become accustomed to the system, performing with accuracy and smoothness at the loader within a month." W. D. Ingle participated in the discussion of this paper.

A paper of C. A. Cabell, of Charleston, president of the Carbon Fuel Co., on mechanization operations at its mines, read by L. N. Thomas, of that company, pointed out that the efficiency of mechanical loading is dependent 10 percent on machinery and 90 percent on management.

The concluding paper at this session, on mechanical loading at the mines of the Little Betty Mining Corporation, near Linton, Ind., prepared by P. L. Donie, vice president of the company, was read by William E. Hamilton, of Knoxville, Tenn., inventor of the Hamilton loader, one of the first successful mechanical loaders used in mining. "Two loaders over a period of 223 days loaded over 75,000 tons of coal at a supply cost of \$782, or a fraction over one cent per ton," said Mr. Donie's paper.

ANTHRACITE TAKES THE FLOOR

The anthracite industry had the right of way on the morning of May 13, with a program devoted to its mining problems, and with E. H. Suender, vice president of Madeira, Hill & Co., of Frackville, Pa., presiding. The first of five papers presented at this session was by C. A. Connell, of Philadelphia, acting executive director of the Anthracite Institute, who outlined the aims of that organization in maintaining and reclaiming formerly lost markets for anthracite. Speaking on "Anthracite Research for Utilization," Mr. Connell stated that the research activities conducted by the Institute through its laboratory near Philadelphia and at Lehigh University, had discovered that anthracite can be used for other than fuel purposes, such as in filtration beds of water purification plants, and for the manufacture of blocks of a greater compressive strength than concrete which may be used for mine props and general construction purposes. Tests of anthracite mine shale are also being made by a pottery company looking to its use in the manufacture of clay products. Reference was also made to the development of mechanical devices for the more convenient use of anthracite by the consumer. "The Institute is satisfied with its investment

Charles C. Whaley, the new chairman of the Board of Governors of the Manufacturers Division



in research," he said. Participants in a discussion of this paper included B. H. Stockett, of Weston, Dodson & Co., of Shenandoah, Pa.; Mr. Lesser; E. W. Parker, of Philadelphia, director of the Anthracite Bureau of Information; and R. D. Hall, of the McGraw Hill Co.

"Results of Present Anthracite Roll Practice" was the subject of a paper by Paul Sterling, mechanical engineer of the Lehigh Valley Coal Co., in which the speaker traced the development of the sizing of anthracite, and attributed the loss of trade and lack of confidence in the anthracite industry to government action in divorcing railroad ownership from coal mines. Those participating in a discussion of this paper were John C. Haddock, president of the Haddock Mining Co. Mr. Parker; Mr. Lesser; R. E. Hobart, of the Lehigh Navigation Coal Co.; E. O. Marty, of the Sherman Coal Corporation; and Mr. Stockett.

E. P. Humphrey, preparation supervisor of the Lehigh Navigation Coal Co., delivered a paper on "Preparation of Anthracite Fines," which presented the methods used in the recovery and preparation for the market of fine sizes of anthracite smaller than barley to the extent of ten million tons a year. Messrs. Sterling and Stockett discussed this paper.

"Speeding up Rock Work in Anthracite Mines," a paper by Russell L. Suen-

der, of Hill & Suender, contracting engineers, described extensive drilling of tunnels through rock preliminary to mining anthracite, and elicited discussion from Mr. Stockett, G. B. Jones, of the Haddock Mining Co., and Mr. Lesser.

The concluding address on the anthracite program was by John C. Haddock, president of the Haddock Mining Co., who in a paper on "Notes on Mechanical Mining in Anthracite," presented a digest of research work and experiments performed by Cadwallader Evans, Jr., of the Hudson Coal Co.; E. S. Christ, of the Weston, Dodson Co.; E. L. Dana, Jr., and George Jones, of the Haddock Company. Mr. Haddock also digressed to discuss economic conditions in the industry. Discussion of this paper was participated in by Mr. Weichel, Mr. Jones, Mr. Stockett, and Hugo Nyquist, mechanical mining engineer of the Hudson Coal Co.

SAFE OPERATING PRACTICE

The second of the two sessions on safe operating practice was held the afternoon of May 13, with Dr. A. C. Callen, of the University of Illinois, as presiding officer in the absence by illness of C. M. Lingle, vice president of the Buckeye Coal Co., of Indiana. The first speaker was R. M. Lambie, chief of the West Virginia Department of Mines, the title of whose paper being the "Cost of Mine Accidents." He said there had

been a "commendable improvement in the reduction of preventable accidents in the coal mining industry." Participants in the discussion of this paper were Mr. Fear and Mr. H. Laviers.

"Safety and Mechanical Mining" was the subject of a paper by W. J. Jenkins, president of the Consolidated Coal Co., of St. Louis, in which it was pointed out that greater safety is possible with mechanical mining methods. The discussion on this subject was participated in by Lee Long, of the Clinchfield Coal Corporation, of Dante, Va.; Mr. Fear, and William Roy, of the Hanna Coal Co., of Cleveland.

F. B. Dunbar, general superintendent of the Mather Collieries, in a paper on "Safety at the Face," said that mining companies which have good accident records are those that have intensive supervision and strict discipline. Discussion of this paper was participated in by J. W. Paul, of the Bureau of Mines, and Dr. J. J. Rutledge, chief engineer of the Maryland Bureau of Mines.

In a paper on "Safety With Conveyors," Albert L. Hunt, general superintendent of the Pennsylvania Coal & Coke Corporation, said the use of conveyor loading equipment contributes to safe operation and reduction of accidents in mines. The subject was discussed by T. F. McCarthy, of the Clearfield Bituminous Coal Corporation.

The concluding paper of this session was on "Safety With Electrical Equipment," by W. P. Vance, general superintendent of the Butler Consolidated Coal Co., in which he pointed out that the workers should be given proper training in the safe operation of such equipment. The paper was discussed by Mr. Ruffini, W. F. Richardson, president of the West Kentucky Coal Co.; F. R. Vinton, of the Rochester & Pittsburgh Coal Co.; Mr. Davis, of the Phelps Dodge Corporation; Mr. Bayless and Secretary Callbreath, of the American Mining Congress.

MECHANICAL MINING IN THIN SEAMS

Mechanical mining in thin seams was the subject of papers at the morning session on May 14, with J. S. McKeever, general superintendent of the Kanawha & Hocking Coal & Coke Co., and president of the Kanawha Coal Operators Association of West Virginia, presiding in the absence of H. L. Warner, the general manager of the company, who was detained. In pointing out the importance of mechanization in thin seams, Mr. McKeever said "there is probably more than twice as much reserve coal in thin seams as in the thick seams," and that the "conveyor will enable a lot of these thin seams to be mined at a price which will put them on the market." He predicted that these seams could be operated with

less labor and less expense. "In a great many of the thin seams, the mining conditions as to bottom, roof and water are much better than in many thick seams, so the operator of a thin seam has advantages over the thick seam operator in those respects," said Mr. McKeever.

The first paper was by T. F. McCarthy, assistant general superintendent of the Clearfield Bituminous Coal Corporation, and covered "Scrapers and Conveyors in Thin Seams." He pointed out that during the past year there was a marked increase in the amount of coal loaded by such machines, brought about by "competitive market conditions requiring a quality product at very low prices." Those participating in a discussion of the paper were E. H. Jenks, of the Rochester and Pittsburgh Coal Co.; J. A. Long, of the Woodward Iron Co., of Alabama; C. F. Richardson, of Kentucky, and Mr. Weichel.

Long face conveyor mining at mines of the Stonega Coke & Coal Co. was the subject of a paper by J. D. Rogers, general manager of the company, in which he said the experiment being conducted by the company with this system was interesting and will be continued. The discussion was participated in by J. K. Brunschwyler, of the Kingston Pocahontas Coal Co., and I. W. Miller, of the Tennessee Coal, Iron and Railroad Co.

C. C. Hagenbuch, mining engineer of the Consolidation Coal Co., delivered a paper on "Conveyors in Thin Seam Mining," in which he pointed out that an average of 14 and 15 tons of coal can be handled per man per eight hours by the loading conveyor, while on individual shifts the production is in excess of 19 tons per man or 170 tons for one crew. Among those discussing this paper was Ridley Warren, vice chairman of the Northumberland Coal Owners Association of England.

The concluding paper of this session was by F. S. Follansbee, chief engineer of the Koppers Coal Co., on "Successful Handling of Mine Refuse," in which he pointed out that in most coal mines it is more economical to bring a certain amount of refuse to the surface than to haul it to abandoned workings.

RECENT DEVELOPMENTS DISCUSSED

Recent developments in mining practice were considered at the afternoon session on May 14, with C. F. Richardson, president of the West Kentucky Coal Co., of Kentucky, presiding. In assuming the chair he struck an optimistic note for the coal industry. "We are having many difficulties, but I am sure we are

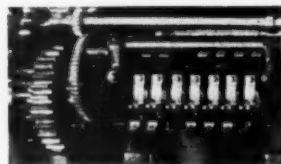
going to overcome them," he said. "Those who represent this big industry are men of affairs who can and will do things, and I am sure they will bring the coal industry out of the condition in which it now finds itself. It is going to be done by the executives of the coal industry; not in Washington and not by anybody except the men who are at the head of these big properties. When we realize that part of it, and take off our coats and go to work, use all of the energy we have, think about our own business and learn all we can about it, and take into consideration the competition and difficulties we have to contend with, we are going to succeed. You and I have seen the coal industry blossom, and it is going to blossom

again. Maybe not for a little while, but it isn't going to be very long before we are going to overcome these difficulties, and when that time comes our business is going to be as prosperous as anybody else's business."

Carl Scholz, coal mining engineer of West Virginia, who was described as "one of the best presidents the American Mining Congress ever had," was given a round of applause and a rising testimonial of esteem when he was presented to the convention at the opening of this session. "I am certainly glad to be here," he said. "It seems like coming home. It is a pleasure to meet my old friends, and I thank you for the greeting you have given me."

The first paper of this session, on "Cutting, Drilling and Blasting," covering changes in cutting machines, etc., by G. C. McFadden, assistant vice president of the Peabody Coal Co., was presented by Carl Lee, of that company. "The object of such operations is to produce the greatest amount of lump coal with mechanical loading," said Mr. McFadden's paper, the discussion on which was participated in by T. J. Thomas, of the Valier Coal Co., of Chicago; Lee Long, Carl Scholz, E. F. Taggart, of the Spruce River Coal Co., of West Virginia, and others.

"Treating Machine Bits" was the next paper, delivered by H. H. Taylor, Jr., of the Franklin County Coal Corporation, of Chicago, in which it was pointed out that since the advent of cutting machines in mining, there have been many improvements in the machines themselves and in the methods of applying them. T. L. Garwood, of the same company, read a discussional paper on this address prepared by Mr. Adams, of the Old Ben Coal Corporation, and further discussion was participated in by Mr. McCarthy, W. S. Schick, of the Stearns Coal &



Lumber Co., and F. A. Miller, of the Franklin County Coal Co.

The next paper, on conveyor slope operation at the Ingle mine in Indiana, was by David Ingle, Sr., of Evansville, president of the Ingle Coal Co., which described the belt conveyor slope operation of that company. The belt conveyor, in operation since December, 1930, is averaging an output of more than 900 tons per day.

D. D. Dodge, general superintendent of the W. J. Rainey, Inc., delivered a paper on "Economy of Creosoted Ties in Coal Mines," prepared in cooperation with Reamy Joyce, vice president of the Joyce-Watkins Co., who participated in a discussion of this paper. The discussion was also participated in by Dr. Rutledge, of the Maryland State Bureau of Mines; J. A. Long; J. G. Crawford, of the Valier Coal Co.; Secretary Callbreath, of the American Mining Congress, and Charles Enzian, of the Consolidation Coal Co.

COAL PREPARATION

The attention of the convention on the morning of May 15 was centered on recent developments in coal cleaning, with Charles Enzian, of Fairmont, W. Va., engineer of the Consolidation Coal Co., presiding in the absence of the scheduled chairman, Erskine Ramsay, of the Alabama By-Products Corporation. "The time has passed when a consumer will buy a ton of coal simply because it is coal," said Mr. Enzian in assuming the chair. "A raw product is of very little usefulness unless it is presented to the consumer in acceptable form. Coal beneficiation or preparation and treatment must precede its utilization. Such beneficiation is a direct sequence of mechanization. Coal producers who expect to succeed must hustle. Beneficiation will establish a uniformity in the shipped product and its intangible result will be that the consumer can depend on the coal the producer promises to ship to him."

The first paper at this session was by R. M. Shepherd, president of the Allegheny River Mining Co., and covered the operations of the "Air-Sand" plant of that company. "The process is still in the experimental stage," said the paper, which was read in Mr. Shepherd's absence by Mr. Norman, chief engineer of the company. The paper was discussed by E. F. Jorgensen, of the Consolidation Coal Co.; Thomas Fraser, of the Hydrotator Co.; Colonel Warren R. Roberts, of Chicago, and others.

E. H. Shriver, superintendent in charge of special construction of the Koppers Coal Co., described the washing practice at the Nellis mines of that company, in

which he pointed out that the successful operation of a coal washing plant by the company has pointed the way to simplification of design of such plants, with reduction in first cost and that the installation of the washer marked a new departure in the wet washing of fine coal. "The results in actual washing practice have approached the theoretical calculations very closely," said Mr. Shriver. The paper was discussed by G. F. Campbell, of the Old Ben Coal Corporation, and E. H. Horne, of the Weyanoke Coke & Coal Co.

WASHING METHODS

A paper descriptive of the new washing plant of the Big Vein Coal Co., at Buckskin, Ind., was delivered by Charles Gottschalk, vice president of the company, in which it was pointed out that the extent of the economic advantage of a positive cleaning plant to treat the smaller sizes of coal depends upon the characteristics of the coal seam, nature of the roof and floor of the mine, the method of mining and the markets served. The discussion of the paper was led by Mr. Arms, of Roberts and Schaefer Co., of Chicago; Major T. M. Chance, of H. M. Chance & Co., and others.

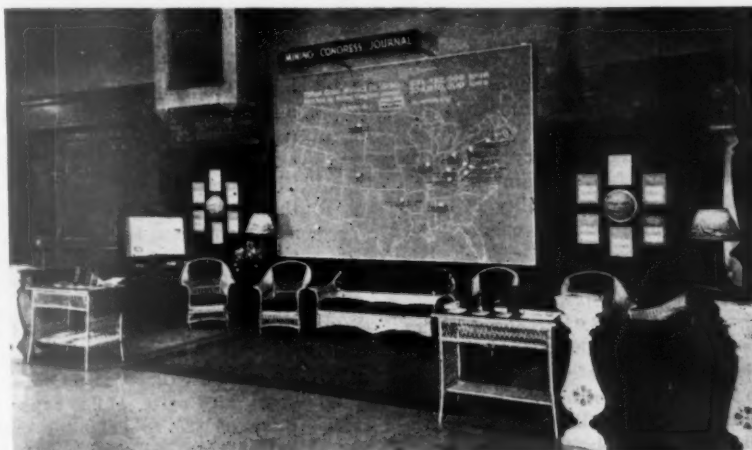
The concluding paper at this session was on coal cleaning at mines of the Pittsburgh Terminal Coal Corporation, delivered by Joseph Pursglove, Jr., of that company, in which he described the new No. 8 Mine cleaning plant of the company, at Coverdale, Pa., which uses the sand flotation process. Discussion of the paper was participated in by Colonel Roberts and Major Chance.

FUEL UTILIZATION

In opening the concluding session of the convention on the afternoon of May 15, devoted to fuel utilization, Secretary Callbreath, of the American Mining Congress, pointed out that the "displacement of coal by the liquid fuels is a startling situation," which calls for the making of "coal as convenient and

cleanly as the liquid fuels are in the production of heat." E. B. Langenberg, vice chairman of the Committee of Ten of the Coal and Heating Industries and past president of the Warm Air Heating Association, presided. E. W. Morell, of the Indianapolis Heating Regulator Co., read a paper on the "Automatic Regulator as the Coal Man's Ally," prepared by Ben L. Boalt, representing the Heating Accessories Industries on the Committee of Ten. Lorin W. Smith, Jr., secretary of the Committee of Ten, spoke on "The Stoker and Its Place in the Future of the Coal Industry." Carlyle M. Terry, a member of the Committee of Ten, representing the Anthracite Institute, spoke on "The Progress in Dealer Education and Consumer Service." Milton E. Robinson, Jr., president of the National Retail Coal Merchants Association, spoke on "The Retail Dealer's Activities and Needs in Furthering Coal Utilization." Oliver J. Grimes, of Chicago, managing director of the Committee of Ten, also briefly addressed the meeting.

The concluding paper of the convention was by Dr. John R. Turner, of Morgantown, W. Va., president of West Virginia University, whose subject was "Research on Coal for Utilization," in which he recommended an intensive research program for coal participated jointly by the federal government, the coal producing states and the coal producing industry. He said it had been estimated by leading authorities that natural gas and its products will in the near future displace from 75 to 200 million tons of bituminous coal a year, a fact which "the coal man must contemplate with dread." His recommended research program covered establishment in the coal states of coal experiment stations similar to the land grant colleges authorized by Congress. This research should have as its object the providing of markets, improving the methods of production and enlarging the range of the utilization of coal.



*The Mining Congress Journal
Booth at the Exposition*

The Exposition

IN the words of Charles Ludwig, veteran staff writer of the Cincinnati *Times-Star*, the exposition of mining machinery, equipment and supplies was "a symphony of mechanical efficiency" and the milling crowds which were constantly moving from booth to booth in the north and south wings of the Music Hall in Cincinnati, where the exhibits were on display during the convention week, were enthusiastic in their praise of the ingenuity of man in evolving such varied and utilitarian types of equipment to do the work in the coal mines of the country. This comment was contained in a signed article by Mr. Ludwig, who has covered all of the conventions of the American Mining Congress in Cincinnati during the last six years, in which the writer drew a word picture of the exposition, the article being accompanied by photographs of some of the exhibits taken by the *Times-Star* staff photographer.

In an editorial, the *Times-Star* referred to the exposition as the "million dollar exhibit," which to its mind was "a sight to stir the pulse of every man who really lives in the twentieth century." According to this paper, the exposition revealed "the last word in mining methods" and that "other devices, worked out with the cooperation of the federal government, give evidence of the ceaseless campaign of the operators to make coal mining safe."

Interest in the exhibits was maintained throughout, and to such an extent that the convention sessions were at times thinned out due to the desire of the coal operators to closely examine many of the types of equipment on display. The opinion was generally expressed that the exposition far surpassed the exhibits of previous years in the new types of equipment presented, the methods of their operation, either in actual equipment or models and the ability of the company representatives to fully explain the purpose and practical utility of the equipment in actual operation.

More than 100 companies, including one from Glasgow, Scotland, and the U. S. Bureau of Mines, were represented in the exposition by exhibits which represented everything from A to Z in the field of mining machinery, equipment and supplies. Many of the exhibitors had displayed their wares at

former expositions, but their showings this year were none the less inviting, while 20 manufacturers had exhibits for the first time. Of course the ponderous exhibits, such as coal conveyors and loaders, mine cars, coal cleaning plants, etc., claimed a great share of the interest in the exposition, but none of the exhibits lacked an attentive interest. Unusual interest was manifested in the newly invented coal saw of Joy Bros., of Ohio, which is capable of cutting out coal in blocks, and the model coal tippie exhibited by the Morrow Manufacturing Company drew large crowds. Following the close of the exposition, this model was sent for exhibition purposes, probably permanently, to the Museum of Science and Industry, at Chicago. The model is on a scale of one-eighth of the size of a real coal tippie, and includes a screening plant, showing the preparation of the coal from the time it leaves the mine cars until it is loaded on railroad cars. The model also includes miniature railroad cars, and the entire exhibit was in working operation throughout the convention.

In demonstrating the operation of their mammoth coal cutting machine, the Jeffrey Manufacturing Company, of Columbus, had two of their mechanics on the floor. With a grin and a smile of satisfaction these men, the famed "Skinny" and "Bill," took pleasure in demonstrating how the machine worked.

Because of its educational advantages, the exposition was made available to inspection by the students of the trade schools of Cincinnati.

Two guessing contests were conducted by exhibitors. The Hercules Powder Company, of Wilmington, Del., offered three cash prizes, \$25, \$15, and \$10 to the persons guessing the nearest number of dummy blasting caps in a glass jar. There were 11,131 caps in the jar and more than a thousand guesses were made. The lowest guess was 300 and the highest 256,000. The winners were: Paul Halbersleben, superintendent of the O'Gara Coal Co., of Harrisburg, Ill., first prize, 11,088 caps; Carl McFarlin, of the Black Diamond Coal Mining Co., of Birmingham, second prize, 11,185 caps; R. E. Reitz, of the Valley Camp Coal Co., of Wheeling, third prize, 11,200 caps. A special prize of \$25 to exhibitors was won by J. P. Jordan, Westinghouse Elec-

tric and Manufacturing Company, with an estimate of 11,173 caps.

The Broderick & Bascom Rope Company, of St. Louis, offered a gold watch to the delegate making the best approximation of the breaking strength of a section of their one-inch "Yellow Strand" wire rope. This piece of rope, taken from stock, had a catalog breaking strength of 84,000 pounds. At the close of the exposition it was sent to Washington University, in St. Louis, where it was put on a rope testing machine. The rope broke at 88,900 pounds, and the ballots disclosed that two delegates had made correct guesses. The winners were William W. Miller, of the Hatfield Campbell Creek Coal Company, Cincinnati, and P. M. Brown, of the Sloss Sheffield Steel and Iron Company, Birmingham. A Hamilton watch was awarded to each.

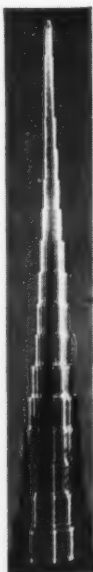
While accidents or injuries at the convention and exposition are rare, the officials of the American Mining Congress take no chances and provide adequate facilities at the Music Hall to give prompt attention to any one who may suffer a casualty. This year, as heretofore, a first-aid station was maintained by the convention officials, in charge of a registered nurse of Cincinnati. Her services were called on for but a few very minor cases from the time the first exhibits were installed until the last one had been removed at the close of the convention.

EXHIBITS OF MERIT

Every exhibit had merit, and it would be difficult to discriminate as to the most attractive or interesting showing of any of the companies. The exhibits were in charge of trained and courteous staff members of the exhibiting companies.

Many new lines of equipment were shown. There were new types of mine cars, and cars which have been in continuous service for one or two years. A model of a coal separator with 100 percent dust collecting system was shown in operation. The exhibits included rubber-lined steel pipe for acid mine water; a high pressure rock dust distributor, a carving set forged from pieces of cable, a new portable conveyor, electric and pneumatic coal drills, equipment for dust-proofing coal, new electric coal drills, new fibre pipe, deep well plunger pump, vibrating screens, new types of automatic-dumping mine cars, latest type conveyors, new type self-dumping cages with automatic car stop, electric mine doors, new type trolley materials for mines, new type of cross bond for copper arc welded application, giving protection against derailed cars and dragging equipment.

There were motion pictures of the new air-sand process for dry cleaning bituminous and the wet process for cleaning anthracite and bituminous. The coal





*An aisle in South Wing of
Music Hall*

saw, an innovation in coal mining, attracted considerable attention. This is a light portable machine for sawing the coal face into blocks of predetermined sizes, the blocks being dislodged from the face by hydraulic pressure pads inserted in the sawed slots, with a capacity of 40 to 50 tons per day. Other interesting exhibits included a low-type, large capacity mine car embodying an unique four-axle principle, which allows the bottom to be free of obstructions; new underground conveyor equipment, motor-driven pumps, cast steel underframe mine cars, latest type low vein bottom cutting machine, perforated screen plates for sizing coal, drums of lubricating grease, a new low type of arcwall cutting machine; a shaker conveyor with rope drive, permitting several units to be driven from one engine; the coal hustler for loading coal that has been undercut and blasted with a capacity of 100 to 150 tons per eight hours, aerial wire rope tramway buckets, semi-automatic central lubricating system for use on coal washers, screeners, breakers, mechanical loaders and mine locomotives; electric lubrigun for mine car lubrication, with tank capacity of 200 pounds of grease, automatic in operation, discharging from 4 to 6 pounds of grease per minute; another electric lubrigun for conveyors, mechanical loaders, mine loaders and tippie equipment.

The exposition also included "Samson" coal cutters and shaking conveyors, latest developments in safe and efficient mine lighting, protective clothing for miners, rotary dump and chain haul car feeder shown in connection with a miniature tippie and operated by push buttons, pit car loaders embodying several new features in design, such as a hydraulic lifting device, sealed ball bear-

ings that require no further lubrication until it is necessary to completely rebuild and overhaul the machine; automatic mine shovels in operation. There was a miniature track model in operation showing how mine signals are applied to facilitate the movement of trams and to protect them against head-on collisions, and an automatic headway recorder for recording on a moving chart the time a tram passes a given location or whenever an operation takes place. Large capacity vibrating screens designed to fit present coal tipples were shown; working model of coal breaker and cleaner, having the combined functions of crushing, cleaning and sizing coal, with automatic separation of refuse material; pneumo-gravity cleaning table, reversible mine fans, and a fan for cooling men working in warm places.

A large map showing the distribution of THE MINING CONGRESS JOURNAL, an electric book giving details of its service to the mining industry, and a voice of mysterious origin which spoke occasionally of the functions of the American Mining Congress, featured the booth of the mining organization.

The wide range of equipment exhibited also included new blasting devices, mining machine and locomotive cables, weight indicating and recording device which automatically prints the weight of each load passing over the scale; latest type low-vein, direct current, electric room and pillar mining machines mounted on self-propelling truck and equipped with modern remote contactor control, the controlling apparatus remaining on the truck when the machine is unloaded and while it is crossing the face; modern, low-vein, mine car air compressor for non-gassy mines; double-

drum, portable electric hoists for scraper loading; new coal-mining machine-cutter chain, made of reinforced section chrome nickel steel; silico-manganese cutter bits; safety mine lighting cable, mining jacks, new post puller; specially mounted mine car wheel driven by a small electric motor, demonstrating the thrust carrying capacity of roller bearings. In demonstrating this capacity a large steel-mill bearing, weighing several hundred pounds, was placed on the wheel. The driving belt from the wheel to the motor was a silk thread.

Other features of the exposition included gears and pinions used on mining machines, improved type cutter bar, a conveyanscreen weighing 3,000 pounds and a small feeder conveyor, sample arch composed of steel tunnel liner plates for the lining of mine tunnels; latest type vibrator screens, testing sieve shaker and woven wire screen cloth; shaker conveyor driving units; pneumatic coal picks; dump cars, automatic switches and locomotive bumpers; new type automatic transfer switch as used with mine locomotives and resistor for mine locomotive service; new cable guide for gathering reels; new fan-cooled squirrel cage motor for use in explosive atmospheres; the multiple speed drive, a four-speed gear unit built in combination with a standard motor, forming a completely self-contained and compact unit; new mine locomotive trolley; a novel brush display mounted on an endless belt; new explosion-tested control box for locomotives; a gas-proof mine

locomotive headlight, claimed to be a most outstanding and recent development, and steel mine ties.

The exhibit by the federal government, through the U. S. Bureau of Mines, featured the proper timbering of a coal mine roof, using full size timber. The set-up showed the timbering of a roof cave in an entry and the proper timbering of the mine face.

As in former years, L. W. Shugg, of the General Electric Co., was Director of Exhibits, and received the commendation of the convention and exposition officials and exhibitors for his able services in carrying out all the details in connection with the proper set-up of the exhibits. The decorative effects and the furnishings of the convention hall, lobby and the equipment booths were also very attractive and up to the standard of previous expositions.

MANUFACTURERS DIVISION MEETING

Meetings of the members of the Manufacturers Division of the American Mining Congress and of its Board of Governors were held at the Gibson Hotel the afternoon of May 12. F. J. Maple, of the John A. Roebling Sons Co., of Trenton, presided. The principal business was the election of new officers and directors and the hearing of representatives of various cities who desired the 1932 convention. The following were chosen officers and directors:

Chairman of the Board—Charles C. Whaley, of the Myers-Whaley Co., of Knoxville, Tenn.

Honorary Chairman—F. J. Maple.

First Vice Chairman—R. C. Becker, of the McGraw-Hill Publishing Co., of New York.

Second Vice Chairman—J. T. Ryan, of the Mine Safety Appliances Co., of Pittsburgh.

Third Vice Chairman—George R. Delamater, of the W. S. Tyler Co., of Cleveland.

Directors for Three Years—P. H. Grunagle, of the Westinghouse Electric & Manufacturing Co., of Pittsburgh; Mr. Ryan, Mr. Delamater, and B. G. Shotton, of the Hendrick Manufacturing Co., of Pittsburgh.

Director for Two Years—J. C. Wilson, of the Ohio Brass Co., of Mansfield.

A resolution of condolence upon the recent death of Nelson S. Greensfelder, of the Hercules Powder Co., the first chairman of the board, was adopted.

Invitations to hold the next convention in their city were received by the board from representatives of the cities of Chicago, Cincinnati, West Baden Springs, Ind.; Louisville and Columbus.

Votes of commendation of the services of E. R. Coombes, convention manager, and L. W. Shugg, Director of Exhibits, in connection with the 1931 convention, were passed by the board.

MINE MODERNIZATION

AT a meeting of the National Committee on Mechanized Mining of The American Mining Congress held at the Gibson Hotel the afternoon of May 13, presided over by Dr. L. E. Young, of the Pittsburgh Coal Co., its chairman, decision was reached to secure late data on the extent to which mines are mechanized. A letter was read from W. H. Rastall, chief of the Industrial Machinery Division of the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, transmitting a report of that department on mechanization in bituminous mines abroad, which will be published in a later issue of THE MINING CONGRESS JOURNAL. In this letter Mr. Rastall referred to the bituminous industry as a laboratory for business generally and predicted that intense mechanization will lead to a more healthy future for the business of the country. Mr. Rastall's letter follows:

"Washington, May 5, 1931.

"Mr. G. B. Southward,
"Mechanization Engineer,
"The American Mining Congress,
"Washington, D. C.
"Dear Mr. Southward:

"Most hearty thanks for your cordial letter of May 2. I appreciate greatly the cooperation you are showing in connection with the data that have been collected concerning the mechanization of coal mines abroad.

"Since it will not be feasible for me to attend the meeting in Cincinnati, I will appreciate it if you will lay this paper before the meeting of your Mechanization Committee.

"The preparation of this paper has been exceedingly interesting. During recent months in connection with the general business depression there has been a great deal of comment regarding the relationship between mechanization and unemployment. Similarly, there has been a great deal of comment regarding the broad subject of over-capacity in industry, the way in which this leads on to unintelligent competition and profitless operation. These experiences are worldwide as well as being conspicuous in domestic business, and from a certain point of view the coal industry can be looked upon as a sort of laboratory serving business generally, for as you well know, the bituminous industry has long suffered from excess capacity and a larger number of miners than is necessarily needed, a demoralizing competition which has led on to more intense mechanization, and I hope a situation that will lead to a more healthy future.

"The preparation of this paper describing the mechanization of the bituminous fields abroad has made it possible to examine the basic forces that are at work and the relationship of all this to business problems of this character in all industry. I sincerely hope that your membership will find the same keen interest in reading this paper that I have enjoyed in its preparation.

"I will also be glad if you will assure your membership that we will be very glad indeed to cooperate in a further examination of these subjects should they feel that opportunity affords.

"Very truly yours,

W. H. RASTALL,
"Chief, Industrial
Machinery Division."

Declaring that the coal industry had suffered by reason of unfair charges having been made that its mechanization program had contributed to the unemployment situation, J. D. Zook, of Chicago, president of the Illinois Coal Operators' Labor Association, a member of the committee, denied this to be the case, saying: "We have always had more than the pick and shovel in coal mines. It would be more appropriate to term the movement one of 'modernization' of mines. The ills of the coal industry and the unemployment situation are placed against the mechanization of our industry and all we are doing is simply modernizing our industry."

Dr. Young suggested that The American Mining Congress be made the clearing house for information on depreciation of mining plants for information of the coal industry in regard to Federal and state taxation matters. He said the committee should consider the matter of capital requirements for mechanized mines, securing data as to the investment required to completely mechanize a mine either new or to modernize a mine. He also said that depreciation rates for certain types of equipment used in mines should be standardized. It was said that mining investments might be reduced by use of mechanized methods.

Notwithstanding there was a reduced production of coal in 1930, Dr. Young quoted figures of the U. S. Bureau of Mines to the effect that 10½ percent of the output was mechanically loaded as against 7½ percent in 1929.

Suggestions as to continued activities of the committee were received from representatives from the coal fields of Ohio, Illinois, Pennsylvania, Kentucky and Wyoming.

The committee approved the following recommendation of Mr. Southward covering information to be compiled which will show the trend and development with underground machines:

"The purpose of the National Committee on Mechanized Mining is to combine and exchange our present knowledge and experience in the use of machines to lighten hand labor, to keep advised of experiments and developments with new mining methods and new equipment, to collect data on the different types of operations which will show the adaptability, safety and economy of the various methods and machines now

in actual use or in the process of development.

"It is recommended that the work of the committee, instead of being confined to mechanized loading, should be broadened and extended to study the trend toward modernization of coal mining in all its phases from the working face to the railroad car.

"The attached data sheet is suggested for gathering the information desired. This includes the general description of the seam, the mining system, and type of equipment but its principal purpose is to show the extent to which machines are being adapted to each of the underground operations. From this information reports can be compiled showing what proportions of the total labor is being employed on machines and what the trend is toward mechanizing the operations which are still largely performed by hand labor. It further shows the production and man hour performances which can be compared to determine whether high records established at individual operations can be duplicated in other mines.

"In the past, information of this nature has been collected by the mechanization engineer through personal visits to the mines. This necessarily limits the study to a relatively small number of operations. The value of any conclusion is directly proportional to the amount of data on which it is based, and in order to make our work as comprehensive as possible it was thought that the committee members could very materially assist by furnishing information on their own mines.

"The data required for this purpose is usually available at the mine office and has always been freely furnished in the past when a personal visit was made. It is always understood that such information will be used by the Washington office in collective form for showing trends and high records and in no case will the name of any company be published or identified with any individual record without their expressed consent.

"It is suggested that the committee members and other coal operators who are interested in the development of improved mining practices be advised of this proposed plan and be asked if they would cooperate by filling in a form which will be prepared."

G. B. SOUTHWARD,
Mechanization Engineer.

MINE TRACKS

A MEETING of the committee on mine tracks of the National Standardization Division of the American Mining Congress, was held at the Netherlands Plaza Hotel, on May 14, presided over by R. L. Ireland, of the Hanna Coal Co., of Cleveland, with J. M. Hadley, of Washington, secretary of the division, as recorder, and attended by representatives of all the coal producing fields of the country and of manufacturing interests. Plans were perfected for further standardizing and simplifying frogs and



Cincinnati as seen from the Carew Tower. Music Hall is located within the circle

turnouts for coal mine tracks for both gathering and main line haulage purposes. Final specifications will be available for the industry within a few months, and it is expected the new standards will bring about tremendous savings in the amount of stocks of track materials to be carried on hand by manufacturers and by coal mining companies. They are also expected to produce economies in the underground transportation cost of coal. This movement was described as an important step in the modernization of the coal mines of the country.

SOCIAL EVENTS

The convention week was marked by some delightful social occasions, the principal ones being the Gypsy Breakfast on the morning of May 13 at the Gibson Hotel in honor of Ralph E. Taggart, of Philadelphia, chairman of the program committee, and the annual dinner and entertainment held the evening of May 14 in the Hall of Mirrors in the new and beautiful Starrett's Netherlands Plaza Hotel. There were more than 75 guests at the breakfast in honor of Mr. Taggart, constituting the officials of the convention and the program committee members and convention speakers. Entertainment was furnished during the breakfast by singers and dancers in gypsy costume. Secretary Callbreath, of the American Mining Congress, introduced the distinguished guests present and Mr. Taggart was the recipient of a traveling game set engraved in gold. The guests received sets of cards as place gifts. Among the distinguished guests present were S. A. Taylor, of Pittsburgh, former president of the American Mining Congress; A. E. Bendelari, president of the Eagle-Picher Lead Co., of Cincinnati; T. F. Jenkins, of the Consolidated Coal Co., of St. Louis, and J. T. Skelly, of the Hercules Powder Co., of Wilmington, directors of the American Mining Congress.

Addressing the gathering, Mr. Taggart advocated changes in distribution methods in the coal industry to bring

about a better relation between the cost of production and the sale price, and also greater attention to the tariff, particularly favoring a duty on Russian anthracite to protect the American market. In praising the activities of the American Mining Congress, Mr. Taggart said the coal industry would be worse off than it is had it not been for the collective work of the organization. In predicting a better day for the coal industry in the not far distant future, Mr. Taggart said it would be necessary for the coal mining men to get together and adopt a sales organization in order to establish a better relation between the cost of production and the sale price.

From start to finish the annual informal "feast and frolic" on the evening of May 14 was a most enjoyable affair to the more than 250 who attended. During the dinner symbolic figures, cut out of huge cakes of ice, were wheeled through the dining hall, representative of the American Mining Congress and the coal industry. These included the letters "A. M. C.," and replicas of "Old King Coal" and the fighting eagle of the American Mining Congress. C. B. Huntress, secretary of the National Coal Association, acted as toastmaster and introduced the notables among the mining fraternity who were present. Mr. Huntress said the age of mechanization had made its appearance in no industry to a greater extent than in the coal industry, and he advocated the same genius in the sale of coal. Singing, dancing, whistling, and skating acts comprised the entertainment.

The management of the Gibson Hotel, official headquarters of the convention, featured its dining service with special "Mining Congress" menus.

Ladies accompanying the delegates to the convention were entertained under the guidance of Miss Amy Pace. They were taken by her on a tour of the new and palatial Starrett's Netherlands Plaza Hotel, to the tower of the Carew Building, at luncheon at the Alms Hotel, a drive through the city, and at bridge parties.

Mechanized Loading Classified by SEAM HEIGHTS

By G. B. Southward

THERE were 46,824,000 tons of bituminous coal mined in the United States during the year 1930 with mechanized loading—using mechanical loaders, pit car loaders, conveyors and scrapers. This figure is taken from a bulletin recently released by the United States Bureau of Mines and compiled by Messrs. F. G. Tryon and L. Mann.

Table No. 1, giving the tonnage mined with each type of equipment, is copied directly from Mr. Tryon's report. Table No. 2 is calculated from the report and divides the total mechanized production so as to show the tonnage mined from each of the three major geographical subdivisions of the United States. In this table the Eastern Field includes the Appalachian District from Pennsylvania south to Alabama; the Central Field includes Indiana and Illinois; and the Western Field includes all coal mined west of the Mississippi but the greater part of this tonnage comes from the Rocky Mountain states.

These figures have been very carefully and completely analyzed by Mr. Tryon in his bulletin to show the growth of the production with each type of equip-

ment and in each of the principle coal mining states. It is not the intent of this article to elaborate upon Mr. Tryon's discussion but merely to bring out some additional points of interest which his report does not cover. This refers particularly to the adaption of mechanized loading to various heights of seams and is based upon data and information gathered through the Mechanization Division of the American Mining Congress. In this article the tonnage figures prepared by Mr. Tryon are divided into three height classifications—high coal including all seams 6 ft. or greater—medium seams including those less than 6 ft. and greater than 4 ft.—and low seams including all those less than 4 ft. in height.

In making the various divisions, shown in the accompanying tables, it should be explained that these are necessarily estimates and are not to be misunderstood as having the same degree of accuracy as was used by Mr. Tryon in his report. However, it is believed that the figures given here are sufficiently accurate to show the general trend as so far developed.

Table 3 divides the total tonnage mined with each type of equipment into the different seam heights worked in each of the three major geographical divisions of the United States.

Table 4 rearranges these figures to compare more clearly how each type of equipment has been adapted to the different seam heights.

We have no recent figures to show the exact proportion of the total tonnage mined in the different seam heights in the United States. In 1920 these figures were compiled by the United States Bureau of Mines and while they would not apply exactly today it is probable that the proportion has not changed very much. In Table 5 these percentages are applied to the total production mined in 1930.

Table 6 combines the figures in Tables 4 and 5 to show the extent to which the production in each of these seam height classifications is loaded mechanically.

TABLE 1—TONNAGE MINED WITH EACH TYPE OF MECHANIZED LOADING EQUIPMENT

Mobile loading machines.....	20,078,000
Pit car loaders.....	19,066,000
Conveyors.....	6,032,000
Scrapers.....	1,648,000
Total.....	46,824,000

TABLE 2—TOTAL TONNAGE IN U. S. DIVIDED BY GEOGRAPHICAL FIELDS

	Total Tons Mined	Tons with Mech. Load.	Percent Mechanized
Eastern U. S.	351,325,000	15,018,000	4.3
Central U. S.	69,115,000	26,306,000	38.
Western U. S.	41,190,000	5,500,000	13.
Total	461,630,000	46,824,000	10.5

TABLE 5—TOTAL TONNAGE MINED IN U. S. CLASSIFIED BY SEAM HEIGHTS

	Percentage	Tonnage, 1930
High Seams	30	138,489,000
Medium Seams	45	207,734,000
Low Seams	25	116,407,000
Total	100	461,630,000

TABLE 3—TONNAGE MINED WITH EACH TYPE OF LOADING EQUIPMENT CLASSIFIED BY SEAM HEIGHTS AND DIVIDED GEOGRAPHICALLY

	Total United States	Eastern States	Central States	Western States
High Seams:				
Mechanical Loaders	18,126,000	4,170,000	11,510,000	2,446,000
Pit Car Loaders.....	16,172,000	2,354,000	13,582,000	236,000
Conveyors	840,000	.....	.....	840,000
Scrapers	393,000	.....	.....	393,000
Total High Seams.....	35,531,000	6,524,000	25,092,000	3,915,000
Medium Seams:				
Mechanical Loaders	1,952,000	1,538,000	214,000	200,000
Pit Car Loaders	2,894,000	1,714,000	1,000,000	180,000
Conveyors	1,204,000	394,000	.....	810,000
Scrapers	70,000	.....	.....	70,000
Total Medium Seams.....	6,120,000	3,646,000	1,214,000	1,260,000
Low Seams:				
Mechanical Loaders .....	.....	.....	.....	.....
Pit Car Loaders .....	.....	.....	.....	.....
Conveyors	3,988,000	3,728,000	.....	260,000
Scrapers	1,185,000	1,120,000	.....	65,000
Total Low Seams.....	5,173,000	4,848,000	.....	325,000
Total All Seams	46,824,000	15,018,000	26,306,000	5,500,000

TABLE 4—TONNAGE LOADED WITH EACH TYPE OF EQUIPMENT IN DIFFERENT SEAM HEIGHTS

	High Seams	Medium Seams	Low Seams	Total
Mechanical Loaders	18,126,000	1,952,000	.....	20,078,000
Pit Car Loaders	16,172,000	2,894,000	.....	19,066,000
Conveyors	840,000	1,204,000	3,988,000	6,032,000
Scrapers	393,000	70,000	1,185,000	1,648,000
Total	35,531,000	6,120,000	5,173,000	46,824,000

TABLE 6—COMPARISON BETWEEN TOTAL TONNAGE MINED AND TONNAGE LOADED MECHANICALLY IN VARIOUS SEAM HEIGHTS

	Total Mined	Mechanically Loaded	Percent Mechanically Loaded
High Seams	138,489,000	35,531,000	25
Medium Seams	207,734,000	6,120,000	3
Low Seams	116,407,000	5,173,000	4.5

PRACTICAL OPERATING MEN'S DEPARTMENT METALS

Practical Operating Problems of the Metal Mining Industry

GUY N. BJORGE, Editor



*Rod mill, classifier unit
and end of ore bin*

Universal Exploration Companies Operations in East Tennessee

By E. E. Ellis*

THE paper here presented is a brief outline of the plant and operation of the Universal Exploration Company, a subsidiary of the United States Steel Corporation, prepared by members of the staff.

The mill is the most modern of the larger zinc ore concentrating plants in the United States, and is showing an unusually high efficiency in maintenance and continuity of operation. During the last twelve weeks of typical operation the delays have amounted to 15.4 hours in an operating period of 3,456 hours for the double units, the majority of the delays being in overloading of classifiers in experimental steps for capacities.

The uniformity in grading of product is exceptional, the smelter returns for the last 20 cars of concentrates giving a minimum of 63.65 and a maximum of 65.20 metallic zinc with an average of

64.58, slightly less than the last 10 months average.

The fundamental design of the plant was by Mr. Floyd Weed, general superintendent, with the cooperation of the engineering staffs of Minerals Separation and Traylor Engineering Companies in the flotation and crushing sections.

The feature of particular interest in the general design is the installation of a crushing, screening and conveying unit as an independent and separate phase of the operation and with a capacity almost six times that of the grinding section. This arrangement permits of great flexibility in the entire operation, as 8 hours in the crushing section will handle more than present flotation capacity in 24 hours, permitting expansion in the production end, and providing excess crushing capacity for road material or other rock products if desired.

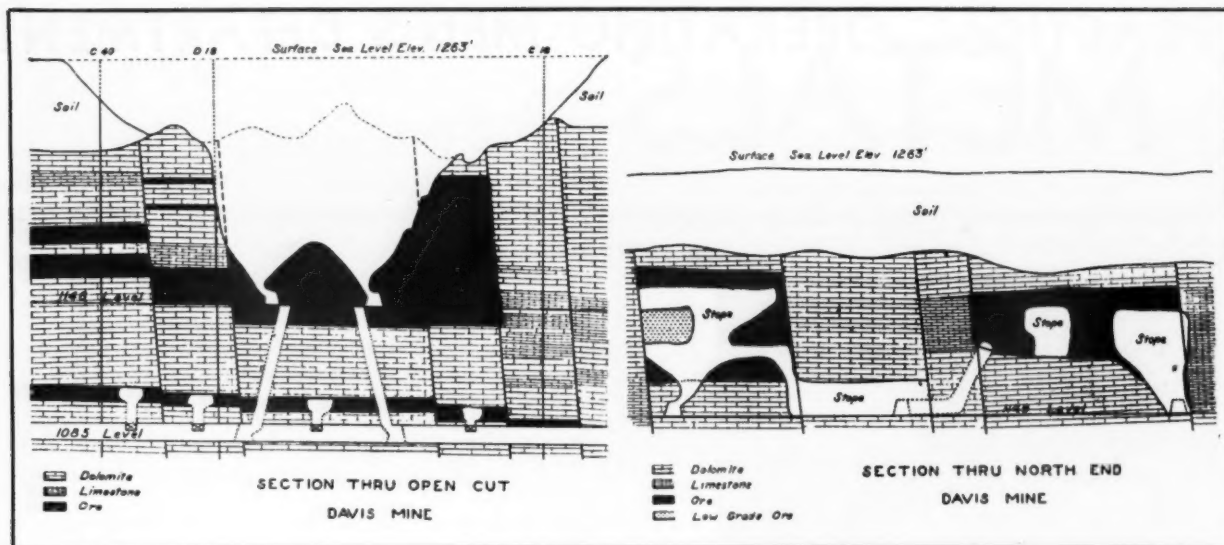
The splitting of the grinding and flota-

tion sections into parallel units of 400 tons each permitted an economical building design whereby an additional grinding and flotation unit of equal capacity or a jigging unit of double capacity can be added without additional housing.

The net result of the carefully coordinated design is that additional installed capacity can be secured at an additional capital expenditure of around \$100 per ton, and the capital cost of the present unit of capacity, being less than \$500 per ton, will compare favorably with that of other flotation mills of steel and concrete construction.

The same feature of flexibility has been worked into the entire system so that it is entirely feasible to operate a zinc ore output and an independent crushed rock output in the same crushing, screening and conveying system, without interference with 24-hour operation in the zinc production end.

* President, Universal Exploration Company.



THE property of the Universal Exploration Company located in eastern Tennessee at Jefferson City, adjoins the town to the southwest, and the plants are connected by a spur track one and a half miles long with the main line of the Southern Railway. There are two operations, one producing zinc blende flotation concentrates, and the other oxidized zinc ores, the essential characteristics of each being described in this paper.

Electric power furnished by the Tennessee Public Service Company is used throughout, the current being delivered at 66,000 volts to the transformer station, and transmitted at 440 volts through parkway cables to the various plant units. Machine and electrical shops and a compressor plant serve both operations, and accompanying maps and photographs show the general layout.

The working force with the exception of a few technical men was recruited locally from a community primarily interested in farming, and the men have shown an aptitude in learning. The labor turnover is so small as to be negligible, and regularly in reporting for work, a characteristic. A few Negroes are employed, but otherwise the native white stock of East Tennessee is used.

The following description of conditions and operations is non-technical in nature, as many conclusive data are still to be compiled, and only the general underlying features of mining and milling are set out.

General Geology

The zinc ore of Jefferson County occurs in the Cotter and Jefferson City formations, which compose the upper third of the Knox dolomite, a Cambro-Silurian sediment. The formation con-

sists of alternating beds of fine grained grey dolomite and dove-colored limestone, the latter often being metamorphosed to a coarsely crystalline dolomite. Small lenses and nodules of blue chert and white chert are found throughout the formation, and at the base of the Jefferson City formation the rock is usually very cherty. The thicker ore bodies occur in areas where the alteration to dolomite has been fairly complete.

The belts of mineralized ground occur on the east flank of a broad gently dipping anticline which pitches slightly to the southwest. The formation strike varies from N. 10° E. to N. 45° E. and the average dip is 3° to 5° S. E.

Exploration

The original exploration work was carried on by means of diamond and churn drills. Previous work by other parties had disclosed the presence of zinc carbonate at points along the strike of the formation which were recognized as the outcrops of sulphide ore zones, and drilling was projected into areas with favorable geological structure and at depths where sulphide ore might be expected. An important virgin area of zinc sulphide ore developed.

Sampling

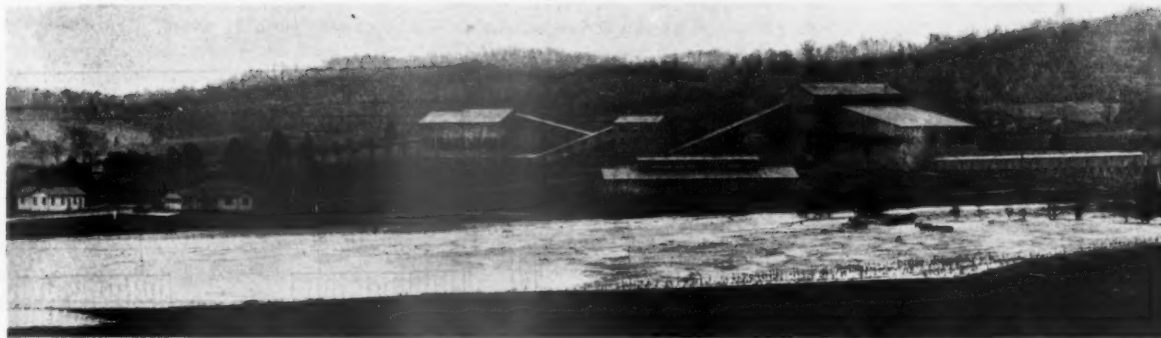
In the sampling of the diamond drilling, the entire core within ore was included in the sample. In the churn drilling, two-foot runs were made in ore, and three-foot runs in barren rock. The sludge and cuttings from the ore runs were put through a splitter at the drill and about 20 pound unwashed samples were sent to the laboratory. When in ore, the churn drill holes were bailed four or five times after each run to guard against salting the following runs,

and in the vent of mud crevices, the holes were cased below the opening to prevent dilution. Results of churn drilling check satisfactorily with underground development. Diamond drilling samples tend to show a lower analysis than the ground, as the core has a tendency to crush in the more brittle and friable sphalerite and enter the sludge. Recovery of sludge was difficult owing to cavities and it was felt that necessary expense therefor was unjustified.

Occurrence of Ore Bodies

The ore bodies occur in areas of strong dolomitization and brecciation. Within these breccia areas the dolomite beds have been severely broken and shattered, and the limestone beds have been either totally or partially dolomitized. The fractures in the brecciated strata have been filled with vein dolomite and sphalerite, and the sphalerite has partially replaced the dolomite. The zinc ore is a high grade light yellow sphalerite which is lead-free, but carries some cadmium. The ore bodies have an irregular broken course, but in general pitch to the south as they extend down the dip of the formation. Usually one side of the ore body has the maximum height of face which terminates abruptly against an unmineralized wall and laterally from this wall there is a decreasing height of face into the brecciated and dolomitized area.

The first ore body to be put into production is called the Davis Mine, and in the underground development and mining of this ore body, a system of ore blocks as a result of jointing has developed. Within a block, the ore horizons are uniform, but from one block to another, there is usually a change in ore elevation.



General view of flotation plant

The joints are of two systems with slight variations; N. 70° E. and N. 30° E. Along these joint planes there is usually a slight displacement of the formation in either a vertical or horizontal direction. Apparently the joint planes have acted as distributors of the ore solutions from a main N. 30° W. fracture system. The mineralization often terminates abruptly against a joint plane, one side being high-grade ore in brecciated dolomite and the other side being barren country rock. Mineralization is usually strongest adjacent to the joint planes. There may be a change in ore elevation at a joint, and there is often a narrow ore run along the joint plane connecting the two horizons. This discrepancy in elevation is frequently in excess of any displacement of the formation, and indicates that from one side of a joint to the other there has been a change in the bed or beds selected for ore deposition.

DAVIS MINE

UNDERGROUND exploration and development of the Davis mine was started through shallow shafts sunk at intervals along the ore body, the purpose being to check the information secured through drilling and to determine its characteristics. While this was the first objective, the work was to fit in with the general plan of mine development that would follow, and approximately 3,300 ft. of drifts and cross-cuts were driven, principally along the bottom of the upper ore body, with this in view and to connect the shafts, the level being at a depth of 117 ft. No exploratory work was done on the 178-ft. level, or lower ore horizon, as it was planned to carry on this work while mining on the upper level.

During the period of development a record was kept of each round, the walls were washed and mapped for future reference, and upon its completion a three-compartment main hoisting shaft was sunk off the ore body.

Due to the frequent changes in the

ore horizon and other structural details mentioned in the geological description of the ore body, mining by breast stopping and benching was found to be the preferred method of attack where the ore bottomed on the main level, with shoveling by hand. The same method is used in sub-level work, the ore either being shot into or trammed to raises from the main level. Where the upper ore body dips below the 117-ft. level the final clean-up will be made through raises from the 178-ft. level through which the lower ore body will also be mined.

Drilling in breast stopping and drifting is done by two men operating a drifter weighing approximately 150 pounds and using 1½-in. hollow round drill steel. In bench work, dry sinker drills equipped with spring handles and weighing 70 pounds are used with one man to the machine, and in raise work dry stopers, 1-in. hexagon steel being used for both.

A semi-gelatin powder lately placed on the market is giving good results in the mine, a 50-pound box having a stick count of 170, for 1½-in. sticks.

At several points the ore extends upward to the bottom of the overlying clays and one of these points was of sufficient extent to warrant stripping by steam shovel, an overburden of 35 ft. in thickness being removed. This ore is being benched into raises from the 117-ft. level.

All ore drawn from chutes and hand shoveled is trammed to lay-bys and from these points is hauled to the shaft by mules. The cars, built by the Lorain Steel Company, a United States Steel Corporation subsidiary, from our specifications, and weighing 2,200 pounds, are of the solid end type with a capacity of 35 cu. ft. They have stood up well under the severe conditions imposed in handling the massive blocky character of ore drawn through chutes and, so far, over a period of one year, have cost us nothing for maintenance.

Cages in balance are used in hoisting,

the cars being dumped through gravity tipples which turn them upside down and automatically right them. There is a separate ore bin for each hoisting compartment, and a waste bin. One-ton end dump cars, also built by the Lorain Steel Company, are used exclusively for waste and can not be dumped through the gravity tipples, thus any mixing of ore and waste is prevented.

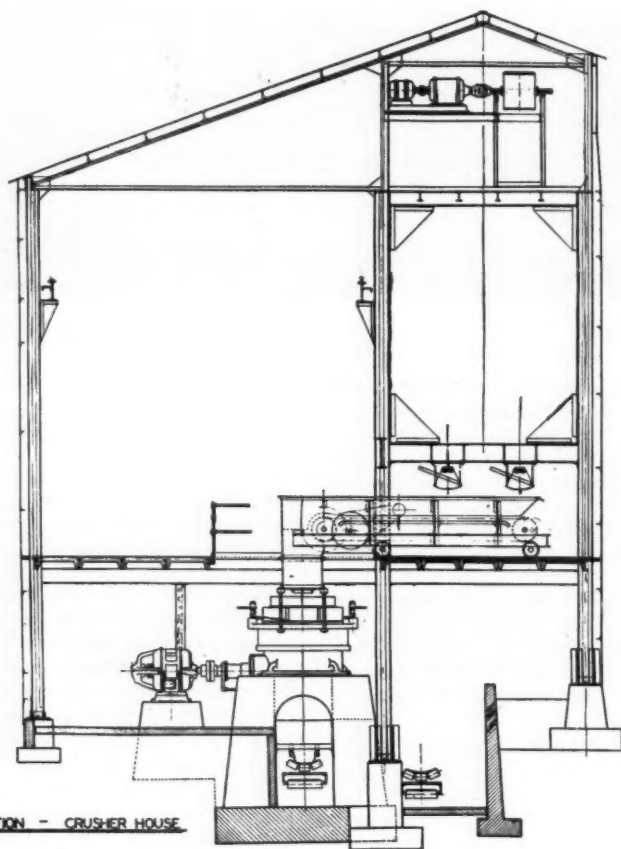
The ore is discharged through finger chutes operated by air cylinders into an automatic dumping car of 80 cu. ft. capacity and hoisted to the crusher bin on an incline tramway. The waste rock is handled to the primary crusher in the same way, but after the day's run of ore is finished, and is then conveyed to a waste dump, from which it is reclaimed for road material.

FLOTATION PLANT

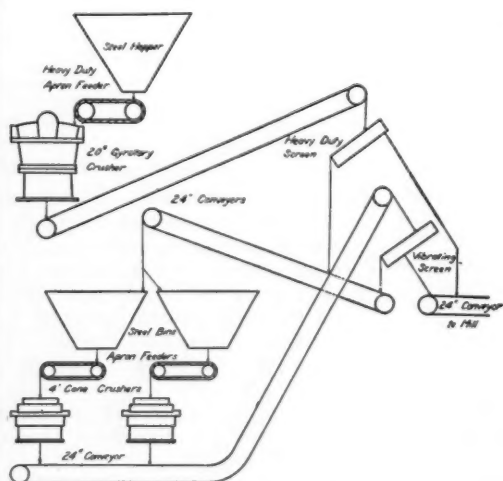
THE flotation plant is located on the slope of a low hill. The buildings are of steel on concrete foundations with steel and concrete floors, well lighted and commodious.

The structural steel and galvanized iron covering were manufactured by the Tennessee Coal, Iron & Railroad Company, and the cement by the Universal Atlas Portland Cement Company, both subsidiaries of the United States Steel Corporation. The galvanized sheets are of copper-alloy steel with two ounces of zinc coating per square foot, the gauges being 18 and 22, respectively for the roofs and sides.

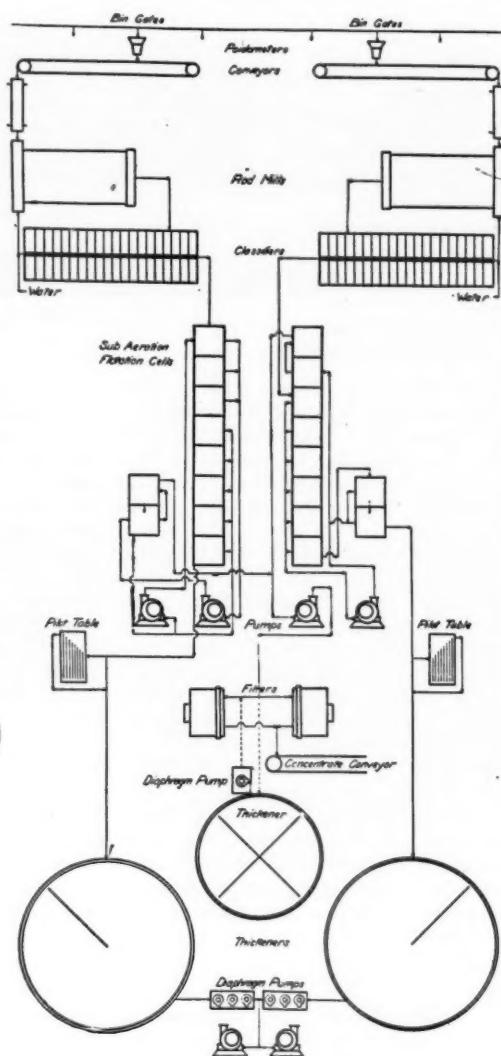
Piping and electric cables were furnished by other subsidiaries, respectively National Tube Company and the American Steel & Wire Company, and with the paint for the structural steel coming from the Illinois Steel Company; all the buildings were fabricated from United States Steel Corporation products except for the window glass.



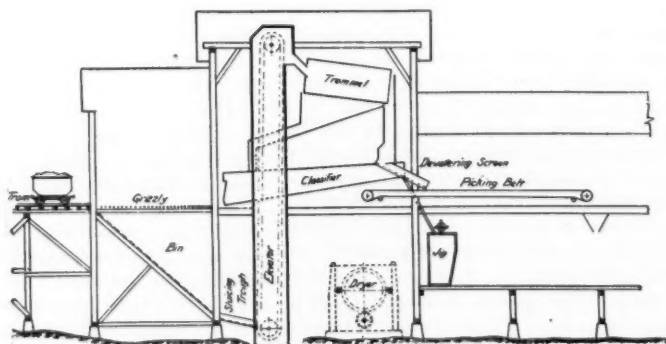
SECTION - CRUSHER HOUSE



CRUSHER FLOW SHEET



MILL FLOW SHEET



CARBONATE WASHING PLANT

Machines and equipment throughout have individual motor drives, with switches and starters mounted on frames placed in convenient and safe locations, and power and light circuits carried in lead-covered cables and conduits. Push-button stations are placed where most accessible.

Crushing

The ore delivered by the surface tram is dumped automatically into a steel hopper under which a 4-ft. heavy-duty apron feeder delivers it to a 20-in. gyratory crusher. The feeder is driven by a motor through a gear reducer at a speed to take care of the tram capacity, and the gyratory is driven by a 100-hp. motor with Texropes. The crusher makes a 4-in. product which is carried by a 24-in. inclined belt conveyor to the screen house located intermediate between the crusher house and mill. Suspended above this conveyor at the head pulley is a magnet which takes care of tramp iron. The ore then passes over a 4 x 9 double surface, heavy-duty vibrating screen, the upper surface being a protection only for the lower $\frac{1}{2}$ -in. screen which is used at this point to take out the damp muck and clay ahead of the Symonds cones. The oversize returns by a second 24-in. conveyor to the crusher building into a 200-ton surge bin, from which two apron feeders feed it to two 4-ft. Symonds cones set at $\frac{1}{2}$ in. A third 24-in. conveyor returns the ore to the screen

house where it passes over a second 4 x 9 vibrating screen having a single surface with $\frac{1}{2}$ -in. opening, the oversize returning to the cones on the same conveyor handling the coarse screen oversize. The amount of oversize at this point is small and is held within narrow limits by the setting of the cones. The throughs from both screens go by a fourth 24-in. conveyor to a 1,500-ton suspended bunker bin in the mill building where the distribution is effected by an automatic tripper.

The conveyors are so arranged that the screens can be by-passed if desired.

The cones are driven by direct connected 100-hp. motors, duplicates of the crusher motor and interchangeable, and the feeders and conveyors by individual motors through gear reducers.

The capacity of the crusher and screen units is about 200 tons per hour and is now being operated at about half that rate.

Fine Grinding

Ore from the 1,500-ton bin is weighed by recording poidometers and delivered to belt conveyors feeding two 6-ft. x 12-ft. rod mills in closed circuit with 6-ft. x 25-ft. Dorr classifiers, the mill feed scoops being inclosed in steel housings with steel chutes for the returning classifier sands. The separation in the classifiers is at 48 mesh, the overflow going direct to flotation.

All water used enters the mill with

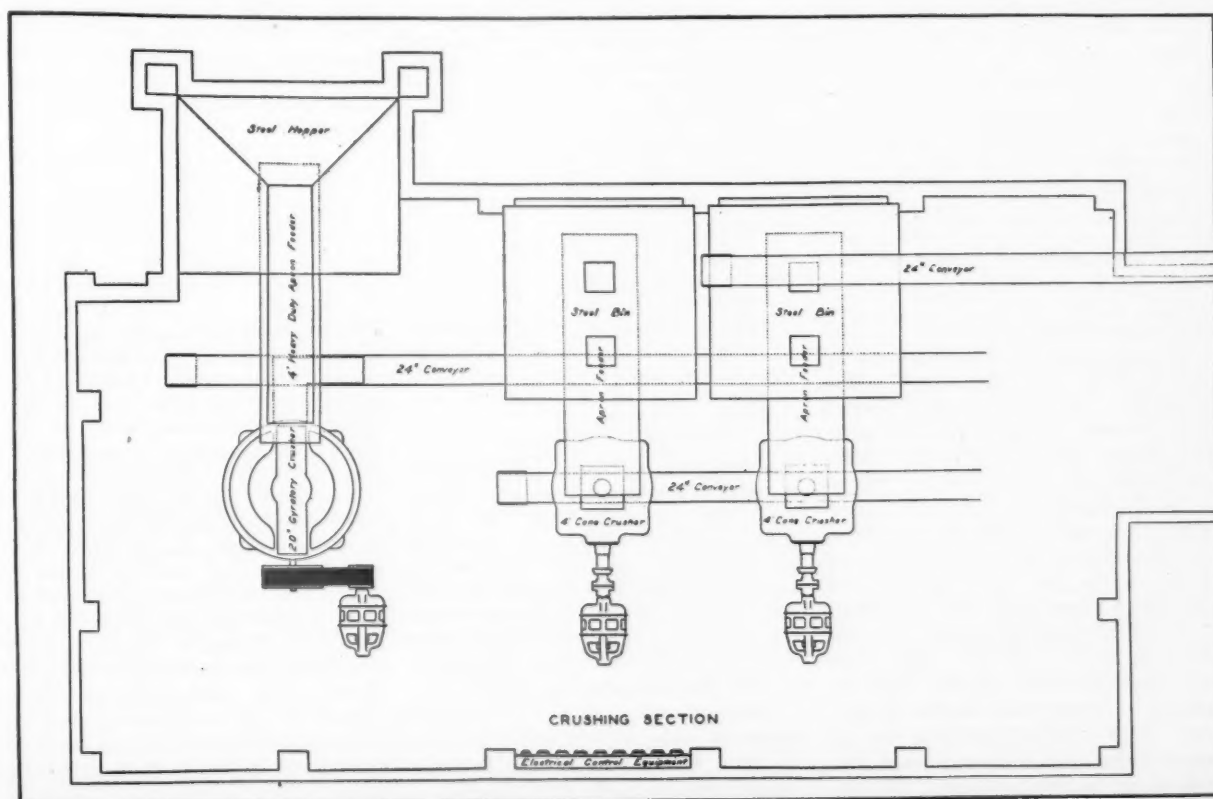
the ore feed and the pulp density of the mill discharge is held at 37 percent moisture and 63 percent solids, this giving a classifier overflow of 4 percent plus 48 mesh and carrying 35 percent solids. Classifier returns contain 20 percent moisture.

The rod mills are driven by 150-hp. motors direct connected through flexible couplings, and the classifiers by Texropes with individual motors. The drives for the poidometers and belt conveyors are individual motors direct connected through gear reducers.

Three-inch diameter high carbon steel rods furnished by the Tennessee Coal, Iron & Railroad Company are used as grinding media. The carbon content is .85 percent, and after being in use 11 months, no rods have broken and the minimum diameter observed is $1\frac{1}{2}$ in.

Flotation

The flotation section consists of two 24-in., eight-cell, sub-aeration, flotation machines each taking the overflow of one classifier which enters No. 3 cell. The froth from No. 3 to No. 8 cells, inclusive, is returned to No. 2 cell by a 2-in. pump. The froth from No. 2 cell goes to No. 1 cell, counter current, fresh water being added at No. 1 cell. Froth from No. 1 cell is finished concentrate and is pumped by a 2-in. pump to vacuum filters, the filter discharge going by belt conveyor to a storage bin at the spur track, or



direct into cars. The reagents used are copper sulphate, .86 pound per ton of ore, fed into the pulp at the classifier overflow; potassium Xanthate, .19 pound, No. 4 Barrett oil, .34 pound, and No. 5 Pine oil, .20 pound. All reagents are measured by bucket type feeders. A cut-out of the tailings of each machine goes to a pilot table for observation.

A 28-ft. thickener and diaphragm pump were provided for thickening the concentrates ahead of the filters, but being able to filter direct from flotation cells, this thickener is used as a storage for concentrates while filter cloths are being changed, and otherwise providing a storage which has proven of value in preventing delays in operation of the flotation plant.

Two 24-in., two-cell, sub-aeration machines are being used for experimental purposes, one on tailings from one flotation machine, and the other as a recleaner in the other unit.

In the latter case the pulp enters the first cell of the large flotation machine instead of the third as described, and the cleaner machine is run counter current ahead of it. So far there appears to be little choice between the two, and a definite advantage in the use of either is not apparent.

The flotation machines are driven by V ropes with a 10-hp. motor to every two cells. Pumps, filters and filter auxiliaries have individual motor drives either direct connected or through gear reducers.

Tailings Disposal

Two 55-ft. diameter traction thickeners take care of the tailings. The clear water overflow is returned to the mill circuit by a centrifugal pump, and the thickened tailings drawn from the bottom of the thickeners with triplex diaphragm pumps and lifted to the tailings pile by a 4-in. centrifugal sand pump. These pumps have individual motor drives direct connected.

A sample house is located conveniently to the mill and equipped with necessary appliances for screening and preparing samples before going to the laboratory for assay. An experimental flotation machine is provided for testing purposes.

The metallurgical results as determined by microscopic and chemical analyses show a satisfactory extraction of the blende, but not of the oxidized minerals. These latter vary in amount over a wide range in open-cut area, and in other parts of the mine where open fractures are encountered, and no method of saving them has been worked out. It is expected, however, that as deeper lying ore bodies are worked, they will occur in lesser amounts. The ex-

traction of the sulphides is over 90 percent and the concentrates carry 64 to 65 percent of metallic zinc.

A method for the positive identification of the blende under the microscope has been worked out, and through this means the uncertainty of distinguishing between the various zinc minerals by chemical analysis was eliminated and definite information obtained on the occurrence of recoverable values in the tailings.

Similarity in color and lustre of the blende and calamine make differentiation difficult, but by a relatively simple treatment with silver nitrate the blende is blackened while the other mineral are unaffected.

By screening to close sizes and then giving this silver nitrate treatment, a grain count of the sample with calculations based on the different specific gravities gives the total zinc as well as that contained in either the blende or calamine. It brings out clearly also attached or embedded particles, and in this way the characteristics of the tailings are readily determined.

Operations have been satisfactorily continuous, and it is due to this condition in part, that results have been so uniform and easily controlled. The mill is now handling close to its intended capacity of 800 tons with every assurance that that tonnage will be exceeded.

CARBONATE OPERATIONS

AN oxidized ore body carrying both carbonates and silicates of zinc has been in operation for several years.

The oxidized ores consist primarily of calamine and smithsonite, calamine predominating. The deposits are irregular in thickness, varying from a few inches to 20 ft. Their shape conforms to that of the underlying limestone and dolomite pinnacles which are of different heights and irregular shapes. Concentration has taken place principally at and near the bottom of the residual covering clays, 10 ft. to 60 ft. thick, the ore closely hugging the weathered surface of the rock pinnacles.

Prospecting

Prospecting for these oxidized ores is accomplished with a tripod and spudding tool. The spudder is made from ¾-in. steel plate 12 in. wide, bent to a 6-in. circle, with ¾-in. space left between the edges of the plate after bending to allow for a springing action that grips the clay as the tool is churned up and down in the hole. Three men are required to operate the drill and a small quantity of water is used in each run for lubricating the clay. An average of 90 ft. in 10 hours is easily made, recovering a complete section of the ground drilled.

Mining

Mining is through small hexagonal shafts about 3 ft. inside diameter. The cribbing is cut from 1-in. oak boards, beveled at each end to make a butt fit and nailed securely to vertical strips that fit snugly in the corners. Sinking is by windlass and bucket, the windlass platform being raised about 5 ft. above the ground, allowing sufficient space for cribbing to be nailed to the corner strips above the ground level. As the shaft progresses in depth, the lining follows down, new sections being added at the top.

Shafts are sunk at strategic points in the ore body, usually being located to reach the deeper ores at the base of the pinnacles, with 4 x 6 timbered drifts connecting. After sufficient ground has been developed by drifting, stopes are started up and along the faces of the pinnacles drawing back from the edge of the ore body to some centrally located shaft. The ground in the stopes is supported by square-set timbering and, if necessary, by filling run through tripod holes put down from the surface to the highest point in the stope.

Underground tramming is wholly by wheelbarrows owing to the irregular nature of the drifts, using as a bed a light steel hoisting bucket which holds about 200 pounds of net ore. The barrows are sometimes loaded from chutes along the drifts, but more often by hand shoveling. Ore is hoisted to the surface by small electric hoists with a speed of 225 ft. per minute. The ore is drawn into light roller-bearing, steel side dump cars of 24-in. gauge and hand trammed to the ore bin at the mill.

Milling

Milling the ore is comparatively simple. Ore from the mine is dumped on bar grates over the mill bin. The oversize lumps are hand sorted and shipped as separate product. The undersize through the grates drops into the bin below and from there is flushed out by water into an elevator which discharges into a revolving screen with a ¾-in. jacket. A continuous spray of clear water over the screen washes out the clay and fine ore. The oversize goes to a picking belt and the fines to a Duplex Dorr classifier. Waste rock is picked from the oversize, the ore going to the dryer bin. The classifier sands are jigged, the concentrates joining the ore from the picking belt, while the overflow after thickening is sent to waste, the water being returned to the circuit.

This simple milling practice gives a product running close to 40 percent zinc and is possible because of the rapid disintegration in water of the associated clays.

PRACTICAL OPERATING MEN'S DEPARTMENT COAL

Practical Operating Problems of the Coal Mining Industry

NEWELL G. ALFORD, Editor

The AUTOMATIC REGULATOR as the Coal Man's Ally

By Ben L. Boalt*

THE automatic heat regulator was invented for coal-fired heating plants half a century ago. Yet during all these 50 years, or rather until very recently, the heat regulator was neglected, scorned, treated like a step-child by the coal industry, the very industry that it would naturally have protected.

I have the privilege of being at this meeting because the step-child seems to be at last appreciated by the coal industry that it was originally designed to aid.

Why is this happy recognition of the value of automatic heat control now, though belatedly, taking place? Simply because, while the coal industry stubbornly ignored the virtues of automatic temperature control, other fuels recognized them, exploited them; and because they exploited them, have succeeded in appropriating for themselves valuable markets that could have been retained for coal.

Coal always could be and always can be automatically regulated. The success of at least one company in selling damper regulators for half a century, and thousands of testimonials from satisfied users, conclusively prove this. And bear in mind that a *satisfied* user of coal is no prospect for another kind of fuel.

To retain your customers, sell them what they want, the comfort, the convenience, the peace of mind, the economy, the freedom from continual furnace-tending drudgery—all this the automatic heat regulator provides.

Automatic coal burning equipment, not only regulators, but stokers, blowers, etc., are at your service, for the benefit of the coal retailer and therefore for the coal producer. But you must promote their use as aggressively as other fuels promote the use of their automatic burning equipment, if they are to serve

you to the maximum of their ability, and through this serving preserve your markets. For, adequately promoted, automatic coal-burning equipment will not only preserve your present markets, but will enormously enlarge them in the future.

If the oil and gas people are allowed to arrogate to themselves the exclusive credit for automatic heat, it will be nobody's fault but your own.

With several of the more advanced, recent developments in automatic heat control systems, just as absolutely uniform room temperatures can be maintained when coal is used as with any other fuel.

Zone or sectional control systems in large buildings and industrial plants permit the constant maintenance of just the temperatures required in all parts of the building at all times, regardless of changes in outside temperature, wind direction, increase or decrease in wind velocity, amount of solar radiation, and no matter what side of the building the sun is shining on. Different parts of the building can be held at different temperature levels, according to the various needs. For instance, offices can be maintained at 70 degrees, departments where heavy labor is performed can be held at 60 degrees, and warehouses can be held at 50 degrees—or any temperature most conducive to efficiency, health, contentment and economy.

It is never necessary to supply more heat than is desired to any part of a building in order to heat another part adequately. All parts can have exactly the temperature they should have, at all times under all conditions. This is all accomplished by automatic control—sometimes thermostatically controlled motorized valves on steam lines supplying sections of the building; sometimes by control of unit heaters or direct radiation, single or in groups; sometimes by combinations of these control systems, according to need.

Bear in mind that this amazing per-

fection in automatic temperature control can all be accomplished when coal is the fuel. It makes satisfied, enthusiastic, coal customers. Are you going to ignore the possibilities for you in promoting such contentment with coal heat when automatically controlled in large buildings, and in this important field again allow the gas and oil people to create the impression that such perfect temperature regulation is only available with *their* fuels? Watch them; they'll do it if you don't beat them to it.

The ultimate in automatic temperature control in large buildings—office buildings, public buildings, apartments, hotels, large residences—is provided by a self-contained, automatically modulating valve for individual radiators. This valve admits just enough steam to the radiator at all times to offset heat losses from the room in which the radiator it is controlling is located, and keeps that room temperature constantly at the level desired, regardless of the changing outdoor temperature, direction from which the wind is blowing, velocity of the wind, the amount of sunshine reaching the room, the number of lights turned on in the room, the number of people in the room, or any other factors which continually affect the amount of steam that should be in the radiator at different times to keep the room temperature uniform. It does this regardless of the amount of steam required in other radiators in other parts of the building. It is responsive solely to the temperature of the particular room in which it is installed.

Probably many of you know what the fixed orifice system of steam distribution is. Well, this device is a long step beyond the fixed orifice, as it is in reality an automatically *modulating* orifice system. The sizes of the radiators' orifices are continually being changed (this really amounts to continually changing the size of the radiators) by the device in accordance with the continually changing amount of (Continued on page 314)

*Accessories representative on Committee of Ten. Presented to Eighth Annual Convention of Practical Coal Operating Men, The American Mining Congress, Cincinnati, Ohio, May 15, 1931.

The STOKER and its place in the Future of the Coal Industry

By Lorin W. Smith, Jr.*

IF SOME years hence a history of the coal industry is written, it can not avoid pointing particularly to the year 1930 as the dividing line between old and new points of view.

The industry needed the year 1930, gruesome and profitless as it was. Necessity is the mother of more things than invention—it was in that year the mother of increased economies, of a new attitude toward distribution, of general readaptations, and of forceful decisions in connection with the utilization of coal.

As in other industries, there has been a steady decline in commodity values. The oversupply of mined products, due to new competing fuels, and the tremendous decline in consumer purchasing (perhaps partially accounted for by a mild winter), have seemingly been more ruthless to the coal industry than perhaps to others.

Today we find the coal industry at a peak of perfection when it comes to the mining of the raw product. Never in history has there been so much care taken toward preparation and sizing. The cleaning of coal and assorting in from 12 to 14 sizes gives us a product of excellent quality, ready for merchandising.

Coupled with this high efficiency of production we must today recognize the extremely low price received for 2,000-pound units, and realize that now our important subject for consideration is coal utilization.

No matter how thoroughly you prepare your coal, you are at the mercy of the equipment in which the coal is used, or how it is used by the consumer. We may have the best coal obtainable—but the consumer through no fault of the producer, is dissatisfied when he tries to use it in an old fashioned heating plant.

Today, whether we like it or not, the public demands comfort and convenience, and it is primarily up to the coal industry to see that such a service is rendered through their fundamental product—coal.

Those who will solve the riddle of the coal utilization have before them one of the most interesting, and, no doubt profitable, of impending developments in American commercial and social life.

Fuel utilization has been a somewhat disorganized industry, and Americans who buy automobiles, electric refrigerators and radios yearly live in homes heated by obsolete equipment. To most of them proper fuel utilization is an impractical dream.

Indications that inconceivable solutions taking form on the part of oil and gas interests have been subjected to much comment in recent months by the entire coal industry. These solutions are striking principally at three improvements of tremendous importance, resulting in automatic heat, namely, comfort, convenience and even temperatures, at the sacrifice of economy.

People today demand automatic heat, and they do not care how they get it. They are willing to pay the price, if their desires are satisfied.

We, of the Committee of Ten—Coal and Heating Industries, are collectively working toward a common goal, and that is the obtaining of greater heating efficiencies from coal, the basic fundamental fuel.

My part of today's picture is to tell you about the stoker and its place in the future of the coal industry. I will not attempt to talk equipment, but rather fundamental results that stokers, when properly applied, will produce.

There are five fundamental economic factors which decidedly favor the utilization of coal over other types of fuel. Let us look our present day problems straight in the face, and see how we can analyze and solve them.

First, we have an unlimited amount of coal lands in which millions of dollars are invested, bearing perhaps the lowest return on the investment than any other industry. The fuel is available, waiting to be mined and marketed.

Second in consideration is—how is this coal merchandised and sold? Some operators have their individual sales outlets, but for the most part the producer is dependent on the legitimate wholesaler. By a legitimate wholesaler, I mean one who serves an economic function, that is, serves as a sales agent for the producer and a purchasing agent for the consumer, and as such absorbs available stocks in an economic manner as produced by the operator.

The uncertainty of outlets, changing as they do from year to year, due to contracts, makes this phase of coal marketing a variable factor. Today we have

introduced a new type of product known as "stoker coal," to be considered by the wholesaler or jobber. To define "stoker coal" is impossible for it is not true that any one type of coal is suited to any one particular type of stoker. It does not pay the wholesaler to carry any great quantity of "stoker coal" adapted to any one make of stoker because of the sparse distribution of stokers of any one particular make in one concentrated market area.

While there are thousands of coal stokers in successful economic operation today, they are so scattered that coal classification for their use is still impracticable. If there were more stoker installations the wholesalers marketing problem would be simplified, and in addition, definite production requirements might be gauged.

But why are not more stokers sold? This is the third phase of discussion. Despite the fact that where utilized in industrial and commercial installations stokers show a definite saving of between 10 and 40 percent, their sale is still limited. Why is this so? Because of the high selling costs necessary to market stokers today. The merchandising of stokers has not yet been satisfactorily solved, and until it is, the sales overhead is bound to remain excessive. When stokers sell on a volume basis, coal marketing will be greatly stabilized.

As our fourth consideration, we turn to the apartment house owner or commercial establishment, which is enjoying automatic coal heat as provided by stokers. Many are the examples of savings averaging between 10 and 40 percent over hand firing, yet many property owners still hesitate to install stokers. Stoker installations show savings over gas and oil mounting in many instances up to 70 and 80 percent, but still stoker acceptance has not been what it should. Substantial economic savings are available to those who are sold on the idea of automatic coal burning.

Our fifth factor has to do with the occupants of the stoker heated buildings or the stoker served industrial plants. The ever-present steady heat and power as provided by stoker fired boilers goes a long way to hold permanent tenants or industrial customers.

With five fundamental economic factors evident, why is it not possible to coordinate these interests into one common endeavor? (Continued on page 314)

* Secretary, Committee of Ten.

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Progress in Dealer Education and Consumer Service

By Carlyle M. Terry*

A DISCUSSION of dealer education must of necessity consider the history and background of the retail coal business in America; for many generations, the retail coal dealer was an order taker, and as time developed, a very independent one. The "Public Be Damned" attitude, passed down by certain operators, seemed to permeate the entire industry, and for an industry to succeed, a situation of this kind must be removed. I am pleased to state this transition is now taking place. Until the economic depression following shortly after the Great War, the progressive dealer with modern equipment and modern salesmanship was by far the exception. At that time, however, competition—which has always been the greatest spur to more efficient activity in business—came through the domestic use of gas, and, to a lesser extent, through the domestic oil burner.

The progressive retailer, ambitious to meet this kind of competition, found it practically impossible to acquire the necessary knowledge. Some slight help was given by the individual operator (at the present time, practically every operating company includes some form of sales promotion in their general organization). One of the earliest attempts to make combustion engineering available in simple and understandable language was the book by Mr. Joseph W. Hays, entitled "How to Build Up Furnace Efficiency." This book was so successful that it is now in its 18th edition and has had a total circulation of over 250,000 copies; it was eagerly bought by the fireman, operating engineer and fuel salesman who had been denied the more formal engineering education. This book was eventually elaborated into a very comprehensive correspondence course on combustion and is still very effectively used by the Hays Institute of Combustion, a commercial organization.

Some six years ago when the anthracite operators formed the Anthracite Coal Service, it became immediately evi-

dent that education of the retailer would prove to be its major activity. In New York, a short course was prepared by combustion engineers, lectures were prepared and a brief manual planned for general distribution. There was an average attendance of over 200 at the five meetings which were held in downtown New York. Incidentally, it soon became evident that the retailer's background of knowledge was insufficient to absorb the more technical side of the course. With this in mind, an intensive study was made of the entire field. It soon developed that increased sales and ability to meet competition must be based on a combination of service and salesmanship, the day of the old-fashioned order taker was passing. A course was planned featuring lectures which included the fundamentals of combustion, knowledge of mining and preparation of fuels, a system of modern record keeping and modern ideas of salesmanship—all couched in very simple language. A new manual was prepared, incorporating the subject matter of the course. This new course was so successful that under the direction of the engineers of the Anthracite Coal Service, over 5,000 retail coal dealers or their employes have attended the schools throughout the anthracite burning regions, and I can say without hesitancy these retailers have at last become fuel merchants.

The Anthracite Institute has prepared a more advanced course, which is now entering into the sixth of a series of five-week classes. This includes several days at the mines, knowledge of combustion, problems in heat loss with various types of equipment, a knowledge of boilers, stokers, furnaces, etc., and finally, work on record-keeping systems, telephone sales and general solicitation. This course has been so successful that each class has had more applicants than could be conveniently handled.

From the beginning, the Committee of Ten has realized that knowledge and education will be the solution of the sales problems of the solid fuel and heating industries. An intensive study is being made as to the best method of ac-

complishing this objective. We find that a number of universities have arranged excellent short courses in combustion and heating; for example, the University of Utah at present has an enrollment of 92 students from 23 states. The entire cost of their course is \$11. I might quote from the Director of the Home Study Department, who confirms my own assertions:

"These people are not completing the lessons as regularly and consistently as other home study classes enrolled in regular university work. A few go right ahead and finish, but most of them, even after prodding from this office, plead lack of time to put on the lessons. I remind them occasionally, feeling sure that the satisfaction will be much greater when the lessons are used as motivation for actual work rather than for reference."

The Extension Division of Purdue University is conducting a course in combustion at Indianapolis, and I understand that here the Engineering School of the University of Cincinnati is now conducting a short course. From the remarks of the Director of the University of Utah, there is a clear indication that a correspondence course without personal contact must of necessity be unsatisfactory. The plans of the Committee of Ten will take this fact into consideration.

I have touched the high spots in what has been accomplished and planned in dealer education. The other phase of dealer activity is *service*—that much-abused word. Our competitors in gas and oil have succeeded in including service at all times in their sales program. When gas first began to replace coal and wood for cooking purposes, demonstrators were available at all times to instruct the housewife in preparing a meal and in adjusting the burners for the greatest efficiency. In Chicago at the present time, a force of 3,000 is being prepared and instructed to readjust burners throughout the city when natural gas is mixed with manufactured gas. The sale of gas and electrical equipment by public utility companies has become

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a very great problem—in one state this has been prohibited by legislation. It is very evident that this sale of equipment and this education of the public has been an important factor in maintaining and increasing gas sales.

The oil burner sales organization feature 24-hour service; incidentally, disputing their own statements as to the safety and convenience of their equipment. Until very recently, the coal merchant has refused to recognize service as a necessary adjunct to sales. He has felt that when the fuel was sold and delivered his responsibility was ended, and in this way he provided his competitors with their necessary sales prospects. I recollect some time ago on Long Island, a former clerk in a coal yard had taken over the agency for an oil burner. When I inquired as to how he expected to succeed in that particular community, he pointed out that he had very carefully kept a record of his employer's dissatisfied customers. This employer, incidentally, being one of those coal merchants who deplored service, as it might add slightly to his overhead. In most parts of the country, I can only find that "service" means prompt deliveries on short notice. This in itself only encourages the public in hand-to-mouth buying. For years I have advocated a competent service department for all coal merchants which would include not only combustion advice, but janitor service. In the average suburban community, a competent janitor is almost impossible to find, and when he is available, he is usually very unreliable. In some communities, ash removal is not provided. This also can be included in the coal merchant's program. At the present time extensive experiments are being conducted in vacuum ash removal in specially designed trucks. This, of course, would involve some slight expense, but I am confident that the average home owner can be educated to its acceptance as readily as he can be educated to the so-called convenience of gas and oil, which can only be enjoyed at a far greater expense than is involved with coal.

It has been impossible in this short period to completely cover this field, but I hope I have indicated that serious thought is being given and progress is being made in these two important things—*Dealer Education and Consumer Service.*

THE STOKER AND COAL'S FUTURE (From page 312)

With these five factors working in unison, the marketing problem of coal

would soon be solved.

As yet there has not appeared an agency to market automatic heat as it may be obtained from coal. Is the solution going to be the formation of a National Heat Maintenance Utility which will sell heat to the consumers? Such an organization would contract to sell heat to consumers at a definite metered basis, providing coal, stoker, and service at a definite predetermined rate. This would stabilize a definite market for a definite coal delivered by the nearest retailer at a specified price. This will stabilize the wholesalers and producers business structure. Stokers will be utilized, as they are adapted to existing requirements, and purchased from that

manufacturer that has the product to fulfill the local requirements.

It would be possible to effect a material saving for the purchaser of heat, satisfy the tenants, create a broader market for stoker sales without an excessive sales overhead, and at the same time stabilize the merchandising of coal.

Or is the solution going to be that some factors in industry are going to succeed in marketing stokers in sufficient quantities to make possible the providing of automatic coal heat to all major factors in industry.

The gas industry is an outstanding example of what the coal industry should do today in merchandising the story of automatic heat as obtained from coal, which is the fundamental safe fuel. Until the coal industry gets solidly behind automatic coal stokers it can not expect to compete with the newer types of fuel.

Then, and not until then, will the coal industry be able to prove to the consuming public that they should depend on coal as the safe, economic and fundamental fuel.

Just as the coal operators of today came from the ranks of railroad men, should the marketers of automatic coal-burning devices not logically come from the coal industry?

You operators, mining officials, and manufacturers of mining equipment are dependent on the development of merchandising plans which have as their basis the utilization of coal.

Proper utilization of coal is accomplished through automatic coal stokers. Profitable business is to be had for the coal industry if you make up your mind to go after it. Profitable markets are to be had by those who are merchandisers of heat, and those who will put forth the necessary effort to merchandise economic heat as obtained from coal.

Present-day opportunities remind me of a war story. Back in the summer of 1918 a transport was being loaded from the Government piers at Hoboken. Stevedores were loading heavy anvils into the hold of a large freighter. A tall, muscular and powerful Negro (incapacitated for military service on account of flat feet) approached the boss stevedore and applied for a job. The boss said that he had sufficient help, but by persuasion the applicant convinced him to give him a trial. Picking up an anvil in each hand (ordinarily requiring three men to an anvil) the stevedore walked up the gang plank with his first load. Midway between shore and the deck, the excessive weight caused the plank to break, allowing the darky to fall through to the water. Two successive times the darky came up sputtering and blubbing. The third time he came up, he let out a blood-curdling yell, "If some of you men don't throw me a rope I'll drop one of these anvils."

That's what I think is wrong with the coal industry as a whole. It is high time that some of us dropped many of our pessimistic ideas about business and began to swim with the business tide by interesting ourselves in the marketing of merchandise which has as its goal the strengthening of the entire coal industry.

The economic demand today is for automatic heat as provided by coal. A broader market for your products will then be developed.

Finally, you will increase your own profits and sales through rendering more secure the profits of your sales outlets.

THE AUTOMATIC REGULATOR

(From page 311)

steam that is needed in a room to keep its temperature uniform at all times, under all conditions.

Temperature can be automatically lowered during the night in buildings controlled by this automatic orifice, where desirable to do so, simply by lowering boiler pressure at night. We have devices which will automatically lower and raise the boiler pressure at predetermined times.

The human mind can not conceive of more ideally comfortable, convenient, efficient, economical temperature regulation than that provided by control of individual radiators.

It is a matter of utter indifference to the device what fuel generates the heat at the boiler. It can be coal just as well as anything else. If coal is the fuel being used when these devices are installed, there can never be any reason for any user wanting to change to another fuel. The job, from your point of view, is to help get these instruments on as many coal-heated buildings as soon as possible, thereby insuring that the buildings will always be heated by coal, because the occupants will be perfectly satisfied with the heat they are getting.

Though the control doesn't care what fuel is used, you, we think, should, inasmuch as it will keep your biggest coal customers permanently satisfied with the fuel they are using.

The recommending of exactly the most suitable system of automatic temperature control for any type of residential building, or industrial plant having complicated control requirements, had best be referred to temperature control specialists, engineers, who are attached to branch offices or distributors, located in all of the principal cities in this country and Canada. Let these men help you to retain or gain coal customers for you by making control installations that assure satisfaction with coal. They are more than willing to do so. They always have been. Be assured that the gas and oil men are not reluctant to seek help in selling automatic controls to prospects or to users whom they want to keep satisfied with their fuels. After a control system has been installed and their customers are thereby enthused, the oil or gas men are shrewd enough to claim the whole credit for their fuels. Is that your fault? Not at all: the automatic controls industry would have been more than happy to have made some coal-user delighted with his heating, if only some alert coal man had got us on the job first.

Urge your dealers to drop into the automatic temperature control branch offices in their cities. They will get a hearty welcome and learn that the boys are eager, trained and equipped to help every coal dealer to keep his coal customers satisfied.

The effective work of the Committee of Ten is ample evidence that the coal industry is awake to its needs and that its future is bright. The belief that the coal industry as a whole realize that automatic temperature control has contributed somewhat to that bright future is a source of profound satisfaction to the automatic temperature control industry.

It's great to believe that we are no longer regarded as a step-child.

The Retail Dealer's Activities and Needs in Furthering COAL UTILIZATION

By Milton E. Robinson*

COMING on the heels of Mr. Terry, I am in some doubt as to whether to pose as one of the retailers his organization has helped to educate, or to take his remarks as an insult and rise to say a few words in rebuttal. Since this is the last session of five long days of tedious gas attack, however, I doubt whether even a first-class knock-down-and-drag-out would be sufficiently interesting to afford you amusement. Anyhow, Mr. Terry is a bigger man than I am.

Therefore, it seems best to try to stand outside of myself and my job and try to size the thing up from that viewpoint. It takes most of the pain out of the admission that we are probably a great deal worse than he paints us, to have him say that the to-hell-with-the-public attitude that has characterized the coal industry in the past (and still does in some quarters) originated with the producer and trickled down to us high-privates in the rear rank. What was more natural than that? Like a bunch of impressionable children, we just imitated papa.

After all, the public had to have the stuff, didn't they? And whatever we think of the progress that seems to be in the making along merchandising lines, we shall all have to admit that it was not our own intelligence that pointed the way; it was outside competition. You will all admit that this afternoon's program would never have been possible if production and distribution figures had not slumped. It is when we find out that we are sick, obtain a good diagnosis of the cause, and set out to do something about it, that we are half-way on the road to recovery.

The coal business is not new, but in its present plight it might as well be. Let's for a minute assume that it is a new business. Something akin to cash registers and amateur cameras 40 years ago—automobiles 25 years ago—electric refrigerators 5 years ago, or stokers today. Let's assume that the public is getting all of its heat and power from some other source. You and I discover coal, and its immense possibilities. What is our first problem? Not, certainly, to set up a great big structure to produce it, and a big dealer-organization to distribute it. There is no need for either

production or distribution force for a commodity for which there is no market. We must get the market first. We must find out what our product is and what can be done with it. Then we must convey that intelligence to people who can profitably make some use of it, and we must do it in a way that makes them want to try it. Whose job is that? Obviously it is the job of the man who holds within his hand the production of that commodity. Did Patterson and Eastman look to their retailers to do that job? Did Packard and Ford? Did Frigidaire?

Unfortunately, our business got its start back in the days when advertising, merchandising, and selling were comparatively unknown. People made as many products as the public would come and carry away. There was no such thing as organized research to develop new uses for a product; each industry, like Topsy, just grew. And the rapid growth of the Nation brought new consumers fast enough to take up the added production that individual production-initiative created from year to year. Naturally, there was nothing in such a growth to develop the kind of brains that could cope with our present situation. So we have a greatly overdeveloped industry, a reduced demand, and few among us have the training necessary to meet the emergency.

If we analyze our common troubles and refuse to be satisfied with the shibboleth that they are due to too many mines and too many miners we may arrive at a striking similarity between the coal operator of yesterday and the coal retailer of the same era. They were alike in the fact that they gave too much thought to the purely physical side of their jobs.

You gentlemen were graduated from the holes in the ground. And when you graduated, your minds stayed down in the holes. There were no graduates from the merchandising departments of your businesses into positions of executive responsibility, because there were no sales departments. They were priority departments.

Wait a minute, gentlemen. I am not talking down to you. We are all tarred with the same stick. The only difference was that while you graduated from the hole in the ground, and your minds stayed down in the hole, we graduated from the wagon-box, and our minds stayed up on the wagon-box. Tonnage, tonnage, and still more tonnage. How

can we get more out of the hole, and into the car, and out of the car, and into the wagon, and out of the wagon and into the bin, and out of the bin and into the firebox.

The whole thing was a cart before the horse. Of course, coal has to be mined and hauled before it can be used; everybody knows that. But does it follow that *since* it has been mined and *since* it has been hauled, that it *will* be used? Once that may have been true, when demand was increasing faster than supply could keep up the pace. During such a period there was no need to develop a school of thought that would look at the problem the other way 'round: to make sure that there was a firebox first, and then a bin, and then a wagon, and then a car, and finally a hole in the ground.

During such a period there was no need to develop any improvement in merchandising methods either at the mine or at the yard. If there was not enough to go around, why worry about careful preparation, clean delivery, or economical use? I repeat: the public had to have the stuff, didn't they?

And then, suddenly, they didn't all have to have the stuff any more. And we snapped our fingers in the time-honored way and said to ourselves, "Why worry? There will be more to take their places."

To make matters worse while outside competition was stepping in and stealing our most profitable markets, another factor was getting ready to complicate the situation. The chaps who were using the most of the stuff were quietly discovering ways to use even the squeal of the pig. Utilities were finding out that it didn't take five pounds of coal to make a kilowatt of electricity. Railroads were discovering that a tender-full of coal could be coaxed to pull the same number of cars a few more miles.

There is no new thought in any of this. You have heard it many times. The only new factor in the situation is the fact that two years ago our industry was the only one suffering from depression. Today we have lots of bed-fellows. We have been in that state for so long that we ought to be able to recommend a remedy to our fellow sufferers. Instead of that, there is a danger that we, like the other professional hobos, may become so used to going around with holes in our pants that we are likely to become reconciled to the situation and (Continued on page 324)

* President, National Retail Coal Merchants Association.

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Research on Coal for Utilization

By John R. Turner*

COAL, oil and gas are the major fuels of the world. They are measurable, durable, transportable, marketable over long distances, and readily substitute for one another. Like the precious metals, under a general bi-metallic standard, they do the work of one another, which binds them together in value. The coal problem, therefore, can not be considered apart from the general fuel requirements of the Nation and of the world. An appraisal of the present coal situation thus calls for an audit of the energy market.

TRENDS IN FUEL CONSUMPTION

Within recent years there has been a prodigious increase in the requirements of energy in the world. Contrast the world's energy requirements for 1913 with those of 1928. Had coal been the sole source of energy, the requirements for 1913 would have been 1½ billion tons, which by 1928 would have increased to 2½ billion tons. But note the point that despite this enormous increase of energy used, there was scarcely any increase in the amount of coal used. A demand for energy is no longer a demand for coal. The enhanced demand for energy was supplied by oil, gas and water power. In 1913 coal supplied 85 percent of the world's energy, as compared with 67 percent in 1928. While coal as a producer of energy was stationary, water power doubled; oil and gas more than trebled.

So much for the situation, world-wide in its scope. Let us examine the corresponding trends within our own country. If we contrast the same years 1913 and 1928, we find a striking parallel. In volume the coal production of the United States today is practically the same as it was in 1913. Within these 15 years there have been increases and decreases, but the trend is clearly horizontal. All told, during these 15 years our population increased virtually 20,000,000, and the per capita energy requirements were enlarged, making a total increase of energy requirements in the United States of 50 percent, as contrasted with an increase of only 25 percent for the rest of the world. And yet the coal production of this country remained practically stationary.

How has this increased energy been supplied? The answer for us, as for the rest of the world, is: "By water, oil and gas." From 1913-1928 coal was stationary while the use of water power was doubled and that of oil and gas quadrupled. Yet comparatively speaking, coal, as a fuel, was losing ground more rapidly in this country than abroad. Whereas coal supplied two-thirds of the world's energy in 1928, coal supplied virtually 50 percent of the energy in the United States.

These data are significant. There can be no explanation of the continued depression in our coal industry apart from these facts.

Were the energy consumed in the United States derived from coal alone, we would have an annual production of over a billion tons, whereas this industry has been forced to yield more than 50 percent of its domain to its competitors, water, oil and gas.

There is much ado throughout the land respecting water power, yet it is conceded by authorities on the subject that by any known methods water can never supply over but a small fraction of our energy requirements. I shall, therefore, limit this discussion to the major fuels of coal, oil and gas.

SIGNIFICANCE OF THE GROWTH OF THE OIL AND GAS INDUSTRIES

The recent and astonishing expansion of the oil and gas industries is of utmost significance to the coal man. It is estimated by first authorities on the subject that natural gas and natural gas products will in the near future displace from seventy-five to two hundred million tons of bituminous coal a year. This fact the coal man must contemplate with dread, because a displacement amounting to a 40 percent reduction in the present demand for coal would close numerous mines and deplete the profits of the entire industry.

The coal men must bestir themselves. They can not fall back upon the complacent policy of "let well enough alone." They need not go back 18 years to 1913 to sense the inroads being made upon their industry. Contrast the two years of 1928 and 1929 alone, and you find that natural gas consumption increased 25 percent. The total quantity of natural gas consumed in the year 1929 represented an increase of 25 percent above that consumed in 1928.

What is the cause of this astounding growth? Natural gas has been produced on a large scale for many years. Vast quantities of it have been wasted in the search for and the production of oil. But there has been a recent and almost sudden development in the transportation of natural gas in pipe lines. These lines are of great length and magnitude, some of them stretching nearly a thousand miles from the source of supply to the points of consumption. Many factors have contributed to this development, but not the least has been recent intensive research, both scientific and technical, to develop cheap methods of pipe production. Pipes of superior strength, so joined and welded as to constitute a single pipe, together with improved methods of cheap and efficient pumping, are making gas a formidable competitor in the fuel market. These improvements have given a new life and an enlarged field to the gas industry. They are the result of large expendi-

tures on research and experiment, to which both the producer of natural gas and the producer of pipes have contributed. These improvements reflect great credit on the forward-looking personnel of that industry.

Apart from these technological improvements, threatening as they are to the coal industry, research scholarship is finding new uses for the once waste by-products of natural gas. For instance, more than 10 percent of the total gasoline production in recent years is represented by casing-head gasoline, a by-product of natural gas. With each gallon of natural gasoline, so produced, there are several gallons of volatile material unsuited for the gasoline market. Only recently such material was a waste product, something to be disposed of as ashes from the furnace. Patient research, however, has found a way to convert this waste material into wealth. It is compressed in steel tank cars and shipped to the Chicago market at a cost of less than 5 cents a gallon, which, on a heat basis, is the equivalent of coal at a cost of \$9 to \$10 a ton.

This product competes directly with bituminous coal. Small gas plants find it profitable to displace coal with this volatile oil as a raw material for the production of gas. These liquefied gases are rapidly coming into favor among gas manufacturers. These products were almost unknown five years ago, but are now increasing at the rate of 50 percent each year. The importance of such developments may be observed in the fact that in 1930 over 18 million gallons were marketed. This is the equivalent of nearly one million tons of coal.

ECONOMIC ASPECTS OF THE ENERGY MARKET

In 1913 coal was king, holding undisputed sway over 85 percent of the entire fuel market. It was indispensable alike for domestic and industrial purposes. Then, the demand for coal was relatively inelastic, the volume of sales varying little with movements in price. Like common table salt, it was a necessity, so that whether the price was high or low, the market demanded a large and regularly recurring supply.

The developments in gas and oil have enabled these intruders to substitute for and displace coal to the extent of 60 percent of its once undisputed domain. This introduces a new economy into the situation. The demand for coal, by reason of ready substitutes, has been changed from an inelastic to an elastic demand. It must compete directly with more attractive fuels comparable in availability and magnitude of production, the utilization of which is a highly developed art and upon which large sums of money are being spent annually for research.

As in the case of all commodities which substitute readily for one another, the prices of coal, oil and gas move in

* President, West Virginia University.
Presented to Eighth Annual Convention of Practical Coal Operating Men, The American Mining Congress, Cincinnati, Ohio, May 15, 1931.

obedience to one another. The principle which determines the relative sales of coal, oil and gas is the same that determines the relative sales of commodities which readily substitute for one another. Quality and service the same as between automobiles of the same class, a slight diminution in the price of one will drive its competitors from the market. On the other hand, prices the same, a slight advantage in the service of one product will drive its competitors from the market. It is for the most part upon this principle of substitution that the fuel market is, to the disadvantage of coal, turning in favor of oil and gas.

COMPARATIVE COSTS

The cost per million heat units of desirable coal at the mine in West Virginia is 5 cents.

The cost per million heat units of gas at the well in Texas is 4 cents.

The cost of transporting this energy per hundred miles is 2½ cents for the coal and 1½ cents for the gas. On this basis, a million heat units of West Virginia coal and a million heat units of Texas gas can be laid down at Chicago at the same cost of 17 cents.

In that market coal has an advantage, in that the final distribution of coal is slightly cheaper than that of gas. On the other hand, gas has an offsetting advantage in that for many purposes it is superior. It was intensive research and the developmental work based thereon by the gas industry that made natural gas the formidable competitor of coal it is in the Chicago market.

RESEARCH IN THE COAL INDUSTRY

When we contemplate the coal industry, its vast interests, the numbers of persons engaged, and when we contemplate coal itself, basic in this age of power machinery and perhaps the richest source of known and potential derivatives, we must realize the importance of a thorough-going research program in coal.

What has research done for coal's companion fuel—oil? Twenty years ago kerosene was the major product of oil. Today, due to research scholarship, kerosene no longer holds its once glorious place among oil products. Had the oil industry been negligent of its future, had it neglected research, long since the electric light and gas have displaced the kerosene lamp, and long since the progressive concerns of Europe, with their research agencies, would have taken complete control of the oil products market. While the oil industry is recreating, enlarging, expanding, through its research policy, what is the coal industry doing?

The National Research Council has made a recent survey which shows that the manufacturing industry is expending annually for research the equivalent of 1.3 percent of its invested capital; the steel industry, .4 percent of its invested capital; the lumber industry, 1.9 percent; and the chemical industry, which includes petroleum, 2.4 percent of its invested capital. The coal industry is conspicuous in this survey by its absence. Should it prosecute research as vigorously as does the manufacturing industry, it would spend annually more than five million dollars. At the present time research on a scale so enormous is not contemplated by thoughtful men in the industry. But all friends of the industry see the necessity for coal to avail

itself of this modern weapon of science to provide markets, improve methods of production and enlarge the range of utilization. The outstanding advances in the uses of coal have, in almost all instances, been made by the consumers at their own initiative and expense. Their object has been the reduction of coal consumption, and how effectively this goal has been achieved calls for no comment in this presence.

It is the hope of many coal men that their prosperity will return with the depletion of the oil and gas fields. I regret this viewpoint. It is not becoming a forward-looking industry to seek its own prosperity in the graveyard of its competitors. On the contrary, oil and gas competition promises to increase rather than to abate. Vast developments in these fuels are under way which it will require 20 years to complete. The coal industry must seek its prosperity in its own initiative. Right now the coal man has his back to the wall. Although he is making use of all available knowledge in his industry, he is being distanced by the superior competition of oil and gas. Research scholarship is his last, but most promising, hope for the future. Only science applied can analyze our coals, show what they are good for, the best uses to which they can be put, and thus point the way to profitable investment in their development.

The oil and gas industry have promoted their own research on a large scale; the coal industry, on the other hand, has had the advantage of such research as was done for it. Research of a far-sighted nature is confined almost entirely to the laboratories of our endowed institutions, of our universities and of the Bureau of Mines. Funds available for the work in such institutions are very limited and the work is often of a desultory character. The newly founded coal research laboratory at Carnegie Institute at Pittsburgh is a worthy exception to this statement; this very fact but emphasizes the dearth of facilities for coal research that exist at present. The industry is obligated to Professor Parr and his coworkers at the University of Illinois and to similar groups of scientists at other university experiment stations. Yet the most conservative appraisal forces one to realize that the facilities and support available are in no way commensurate with the magnitude of the problem. The situation justifies immediate and determined action.

For want of centralization and viewpoint, the industry is not in position to undertake of its own accord large expenditures in a research venture whose returns are necessarily deferred. While the prosperity of several states is largely based on coal, yet no state has a monopoly on the supply. In fact, coal is so extensive geographically and so contributory to the well-being of the Nation as to make the coal problem national in its scope. A research program commensurate with the problem must be pursued jointly by the industry, by the coal-producing states and by the Federal Government. That program must be practical enough to reach the coal problem as it actually exists.

The Morrill Act, signed by President Lincoln in 1862, furnishes a splendid suggestion for the character of research program appropriate to the coal industry. That act was based upon the as-

sumption that agriculture, basic resources, the mechanic arts and military science were essential to the feeding, clothing, sheltering and protection of the people—the security and prosperity of the Nation. Because they were regarded as foundational to the national life, the Government contributed to their development by encouraging the establishment of experiment stations in the several states. Because of the infinite variety and wide distribution of soils, no single or centrally located agricultural experiment station was feasible. Rather, such stations were distributed among the states, and the soils round about each such station were at once the laboratory and the subject-matter of its research. Each station was fostered by a joint interest of the Federal Government and the state whose soils were the subject of its research. It is fitting that the Federal Government should be the directing authority in this extensive program of agricultural research.

Coal, like agricultural soil, is one of the Nation's basic natural resources. Coal, like soil, extends over vast areas. Coal, like soil, can be monopolized by no state or section of the country. Coal, like soil, exists in great variety and can be properly studied only by research institutions placed in the several sections of the country where such varieties exist. The Federal Government should foster research in coal and other basic resources, as in soils, on the ground that they are essential to the Nation's prosperity. Each coal state should be jointly interested with the Federal Government in coal research on the ground that its development, like that of soil development, adds to the prosperity of the state. Moreover, ownership in coal, as in agricultural lands, is scattered. There is not the unity of control to permit large scale and centralized research. As in the case of agriculture, jointly owned stations in the several coal-producing states would at once give unity to a national research program and afford the variety which is adapted to the range and differences in our coal deposits.

Such a program, however, must limit itself to basic knowledge and research, leaving the specific problems where they belong, to the coal companies themselves. The spring that keeps the industry in motion will be broken the moment it permits itself to be subsidized or its rightful work to be done by the Government.

It is, therefore, the suggestion of this paper that a program for coal research, similar in organization and control to agricultural research, should be adopted.

It is very clear that in the order of progress the initiative for coal research will come not from the Federal Government and not from the states, but from the industry itself. The industry must first of all show faith in its own program and begin its promotion by investing in it. There must be no divided loyalties. Only a united front, backed by a thorough organization, will command the confidence of the state and Federal Governments in the project. To the end of a thorough-going program of coal research, national in scope and foundational to the development of this industry in all of its aspects, it behooves the coal men to get together in effective organization to analyze their problem, define their objectives, and suggest the ways and means to attain them.

NEWS OF THE MINING FIELD

Zinc Institute's Galvanizing Program Receiving Support

Mining companies of the Tri-State district have shown a ready response in subscribing to the American Zinc Institute's galvanizing program, according to Julian D. Conover, secretary of the institute. More than a dozen of the largest companies have voluntarily signed to subscribe 12½ cents a ton of production toward a fund to promote the better galvanizing program, and managers of other companies, whose action must await meetings of boards, have signified assurance that their companies would participate, he said.

Companies who have voluntarily subscribed represent about 50 percent of the district's output and it looks as if the district would join the campaign almost to a unit, Conover said.

The ready response of the Tri-State operators, combined with the fact that smelters have been contributing 25 cents a ton on metal output since the beginning of the year, is enabling the institute to organize the galvanizing program with a minimum of difficulty and delay, according to Secretary Conover.

The institute is attacking the sheet problem first, as it is the largest consumer of zinc in galvanizing and offers the largest outlet for metal. If the program receives the right kind of support and sufficient money is advanced, the program will be extended to other forms of galvanized products as soon as time will permit, President Roosevelt stated at the annual meeting of the institute at St. Louis in April.

Hardening Process for Copper Perfected at Montana School of Mines

A successful process for making copper harder than most common steels has been perfected at the Montana School of Mines, it was announced April 28 at a meeting of the Montana Section of the American Institute of Mining and Metallurgical Engineers at Butte.

Although metallurgists have been working on a process of hardening copper for several years, the first public announcement of the development of successful heat treating was made in a paper read before the meeting by H. F. Silliman, research fellow in metallurgy at the Montana school. Mr. Silliman

presented a complete account of the hardening process, its effect on copper and the added strength that is given the red metal by the process.

Copper can be brought to a hardness beyond that of structural steel by the new process, it is claimed, without adding any appreciable weight to the alloy. Electric conductivity of the copper is reduced only about 30 percent by the addition of the elements of nickel and silicon, used in the process. Mr. Silliman has carried out his research work under the direction of Dr. Francis A. Thomson, president of the Montana School of Mines, and Dr. Curtis L. Wilson, head of the metallurgical department. Mr. Silliman pointed out that by additions of nickel and silicon it had been known for years that copper could be hardened, but under the new process the alloy responds to heat treatment up to various degrees of hardness depending upon the heat applied, until a tensile strength of more than 100 pounds to the square inch has been attained, a hardness of more than one and one-quarter times that of structural steel. The new process is important, it was said, in that it allows the metal to be pressed or put into the wanted shape before the alloy is hardened to the required strength. Samples of the alloy in various stages of hardness were shown at the meeting.

Brazilian Manganese Exports Show Decline

Reduced prices in the world market, coupled with competition from other countries and the effects of revolution at home, brought about a heavy decline in Brazil's exports of manganese during the last year, according to the Commerce Department.

Brazilian foreign shipments of manganese amounted to 192,122 metric tons, valued at \$1,564,870, in 1930, as compared with 293,318 metric tons, valued at \$3,370,971, in 1929.

Practically the entire 1930 exports went to the United States, not more than 15,000 tons having been shipped to other countries, chiefly France and Belgium.

Reports emanating from Rio trade circles also state that Russian manganese was obtainable during the year at prices which made Brazilian production almost unprofitable.

Fluorspar Industry in 1930

The fluorspar industry was adversely affected by the general decrease in operations during 1930 in the industries in which this mineral is used, and as a consequence the domestic fluorspar producers' volume of business was the smallest since 1921, according to a statement prepared by Hubert W. Davis, of the Bureau of Mines. Of interest are the substantial decrease in domestic shipments; the pronounced increase in imports from Germany and France; the increase, effective June 18, from \$5 to \$7.50 a short ton in the rate of duty on fluorspar containing 93 to 97 percent of calcium fluoride; the large stocks of fluorspar at consumers' plants on December 31, especially the stocks of 89,000 short tons that have been accumulated at basic open-hearth steel plants; and the accomplishment of the first river-rail shipments of fluorspar to the Pittsburgh district.

Shipments.—The shipments of fluorspar from mines in the United States in 1930, amounting to 95,849 short tons, consisted of 85,094 tons of gravel fluorspar, 4,281 tons of lump fluorspar, and 6,474 tons of ground fluorspar. The general average value for all grades per ton f. o. b. mine shipping points was \$18.22, 84 cents less than the 1929 average. The general average value of the fluorspar shipped to steel plants in 1930 from the Illinois-Kentucky district was \$16.99 a ton, compared with \$17.36 a ton in 1929. Fluorspar was shipped from Colorado, Illinois, Kentucky, Nevada, and New Mexico in 1930, of which only Colorado recorded an increase.

There was a decrease in shipments of fluorspar in 1930 to each of the industries, except the cement industry, in which the mineral is used. Domestic producers shipped 35 percent less fluorspar to steel plants and 37 percent less fluorspar to foundries in 1930 than in 1929. In the ceramic industries the shipments of fluorspar to manufacturers of glass and enamel decreased 45 and 44 percent, respectively, but the shipments to cement plants were a little more in 1930 than in 1929. Shipments of acid-grade fluorspar from domestic mines were 24 percent less in 1930 than in 1929.

Imports.—The imports of fluorspar into the United States in 1930 amounted to 64,903 short tons, valued at \$544,656,

and are the third largest ever recorded. The imports in 1930 showed an increase of 19 percent and were equivalent to 68 percent of the total shipments of domestic fluorspar in 1930.

The greater part of the fluorspar imported is sold for use in the steel industry. According to reports of the importers to the Bureau of Mines the selling price at tidewater, duty paid, of the imported fluorspar sold to steel manufacturers averaged \$17.52 a short ton in 1930. The selling price at tidewater, duty paid, of imported grounded fluorspar, which was sold to manufacturers of glass and enamel, averaged \$34.93 a short ton in 1930.

Germany was the chief source of imported fluorspar in 1930, supplying 23,797 short tons, as compared with 16,488 tons in 1929.

No International First-Aid and Mine-Rescue Contest To Be Held In 1931

No national or international first-aid and mine-rescue contest will be held in 1931, it is announced by Scott Turner, director of the United States Bureau of Mines. The decision to forego the contest this year was influenced by a number of considerations not the least of which is the fact that the method of financing these noteworthy gatherings has not been satisfactory. It is hoped that by next year provisions may be made whereby in the future the Bureau of Mines can adequately finance such events.

Since the Bureau of Mines came into existence in 1910, one of its numerous functions has been the sponsoring of national or international first-aid and mine-rescue contests. These contests bring together about 50 first-aid and 15 mine-rescue teams from 15 or more states; some years, teams from Mexico and Canada have participated. The teams chosen are usually the winners of company, district, or state contests and the trip to the national or international meet is a reward for expertness in first-aid or mine-rescue work.

The contests have not been held annually because it seems desirable to discontinue them during the war and, in 1922, as well as in 1924, the business depression caused postponement on account of the financial outlay involved in sending each participating team of 5 or 6 men considerable distances; in addition, the cost of the meet to the city in which it is held is approximately \$5,000, as the Congress furnishes the Bureau of Mines no funds from which to pay for such essential expenditures as rent, printing of programs, and visits to adjacent mines and plants. Moreover, it is necessary to have the services of 75 to 100 experts in first-aid and mine-

rescue work to act as judges; these men come from many parts of the United States, and here again the expense devolves upon the judges themselves or upon their employers, as the Federal Government allows the Bureau no funds from which services of this kind can be paid.

The first of these contests was held in Pittsburgh, Pa., in 1911. Others were held as follows: Terre Haute, Ind., in September, 1914; San Francisco, Calif., September, 1915; Pittsburgh, Pa., September, 1919; Denver, Colo., September, 1920; St. Louis, Mo., September, 1921; Salt Lake City, Utah, August, 1923; Springfield, Ill., September, 1925; San Francisco, Calif., September, 1926; Pittsburgh, Pa., August, 1927; Butte, Mont., August, 1928; Kansas City, Mo., September, 1929; and Louisville, Ky., September, 1930.

Arizona Loses Appeal to Halt Hoover Dam

The law authorizing the construction of Hoover Dam on the Colorado River was sustained as constitutional May 18 by the United States Supreme Court.

In rendering a decision in the suit brought by the State of Arizona, the court declared that the state succeeded in showing that it may suffer injury as a result of distribution of water from the reservoir. If at any time in the future her rights to water from the river should be impaired, the court said that the state might take appropriate legal action, but that it could not deliver a judgment based on the assumption that the state's rights would be injured.

Work on the dam, already under way, will go forward as a result of the decision.

Metal Mine Accidents Reduced in 1930

Better safety conditions at metal mines in the United States during 1930 are reflected in reports for that year which have been received from mining companies by the Bureau of Mines. Scott Turner, director of the Bureau of Mines, states that while some companies have not as yet sent their accident reports to the Bureau, a sufficient number have reported to indicate very gratifying progress in accident-prevention work during the past year. A special tabulation of the returns for 1930 which had been received by the Bureau up to April 18, covered 551 identical metal mines that were in operation in both 1929 and 1930, shows a reduction of 17 per cent in the accident rate during the latter year. The rate for 1930 for these companies was 182 accidents for each thousand men employed while the rate for the same mines in 1929 was 220 accidents per thousand men employed.

The fatality rate for these companies was 3.08 per thousand employees, the same as in the previous year, but a substantial reduction was effected in the rate for nonfatal injuries, the figure having been reduced from 217 per thousand employees in 1929 to 179 in 1930.

According to Mr. Turner the average working period at these mines was 285 days per man as compared with 311 days in the year before. The total number of man-shifts worked by all employees at these mines was 18,700,000, about 19 percent below the level of the previous year.

The foregoing figures represent companies that employ about 75 percent of all men that work in the metal mines of the United States. Final and more detailed figures covering the entire metal mining industry will be published as soon as reports have been received from the few remaining companies that have not as yet sent in their returns for 1930 to the Bureau.

Arizona Governor Seeks Aid of 11 Governors in Copper Duty Fight

In a letter to the governors of 11 states Gov. George W. Hunt, of Arizona, asked their cooperation with Arizona in a fight for a protective copper tariff.

The Arizona chief executive directed the attention of the governors of Montana, Utah, Michigan, Nevada, New Mexico, Tennessee, Virginia, North Carolina, Pennsylvania, California and Washington to "the critical condition of the copper mining industry of the United States and how all copper producing states are affected by it."

"You are aware," he said, "that copper mining is one of the leading industries of the West. In Arizona it is of the first magnitude."

"It is obvious," he continued, "the destruction of such an industry would be serious to the country and a calamity to Arizona and other copper mining regions of this country. During the past eight years the life of this industry has been threatened. Today about 75 percent of the industry is inactive. A few days ago the United Verde Copper Company, at Jerome, Ariz., announced it would discontinue operations indefinitely. The company is one of the largest copper mining enterprises in the United States. A crisis has been reached. Something must be done to protect the American copper industry from being wiped out."

"The precarious condition of copper mining is due in large part to the unrestricted entry into this country of copper from Africa, South America, as well as Canada and Mexico. Because of the extensive deposits of rich ores easily mined by cheap labor, American copper can not compete with the for-

eign metal even in our own markets. Another detrimental factor is the temptation of finance to close high-cost American mines in favor of low-cost foreign mines. The reason for this action is clear when it is known that money from the same sources is invested in foreign as well as in our domestic mines."

Gypsum in 1930

Production of the gypsum industry in 1930 fell below the level for the preceding year, according to the United States Bureau of Mines, based on reports received from 56 operators in 16 states and collected in cooperation with the Geological Surveys of Iowa, Kansas, Michigan, New York, Oklahoma, South Dakota, Texas, and Virginia.

The quantity of gypsum mined in the United States in 1930 was 3,471,393 short tons, a decrease of 1,544,739 tons, or 31 percent, compared with 1929. This production, however, was greater than that of any year prior to 1922 and was more than 10 percent larger than that of 1920.

The total value of the calcined and uncalcined gypsum sold by producers was \$27,051,484, a decrease of \$4,241,485, or 14 percent, compared with 1929. The quantity of gypsum sold by producers without calcining in 1930 was 989,591 short tons, a decrease of 76,106 tons, or 7 percent, compared with 1929, and was valued at \$1,886,254, or \$1.91 per ton, a decrease of \$210,525, or 10 percent, in value and of 6 cents per ton; the quantity of calcined gypsum sold by producers was 2,191,376 tons, a decrease of 1,170,204 tons, or 35 percent, and was valued at \$25,165,230. This was a decrease of 14 percent in total value compared with 1929.

New York continues to be the largest producer of gypsum. The production of crude gypsum in that state in 1930 was 912,070 tons, a decrease of 29 percent from that of 1929. This was 26 percent of the entire quantity mined in the United States. New York is also the largest seller of gypsum, marketing 275,294 tons without calcining, or 28 percent of the United States total, and 573,602 tons calcined, or 26 percent of the total. These figures represent a decrease of 8 percent in the uncalcined and 33 percent in the calcined gypsum compared with 1929. Other important states in the production of crude gypsum in 1930 were Michigan, 519,225 tons; Iowa, 481,047; Texas, 359,315 tons; and Ohio, 255,337 tons. These five states reported 73 percent of the total production of crude gypsum in 1930.

The importation of gypsum constitutes quite an important factor in the industry. In 1930 eight importers with 13 plants in 10 states, namely, California, Connecticut, Massachusetts, New

Hampshire, New Jersey, New York, Pennsylvania, Vermont, Virginia, and Washington, reported to the Bureau of Mines that they imported 794,970 short tons of crude gypsum, a decrease of 22 percent compared with 1929.

Tri-State Plants Go Without Accident Four Months

Nine mines and four tailing mills of seven companies in the Tri-State District, reporting to the accident prevention department of the Tri-State Zinc and Lead Ore Producers' Association have worked through the first four months of 1931 without a lost-time accident.

Census of Copper Mining Industry

The Bureau of the Census announces that, according to data collected in the Census of Mines and Quarries, taken in 1930, the value at the mine of the production of copper mines in the United States in 1929 amounted to \$283,336,884. This production was reported by 143 enterprises, which employed 44,493 wage earners (average for the year) and reported power equipment with an aggregate rating of 701,214 hp. In 1919, the last preceding year for which data were collected for Mines and Quarries by the Bureau of the Census, the number of operators engaged in the production of copper was 195, the number of wage earners employed was 43,717 (average for the year), and the aggregate horsepower rating was 523,591.

The copper-mining industry embraces those enterprises in which copper is the most important metal contained in the ore mined. Data for copper reported as secondary in importance to other metals are included in the reports for the industries in which such metals are of chief importance.

The statistics for 1929 with comparative figures for 1919 are given in the following table:

SUMMARY FOR THE INDUSTRY: 1929 AND 1919

	1929	1919	Percent of increase or decrease (—)
Number of enterprises*	143	195	—26.7
Number of mines.....	180	226	—20.4
Wage earners (average for the year)†	44,493	43,717	1.8
Wages.....	\$64,849,996	\$66,390,194	—2.3
Cost of supplies, fuel, and purchased electric energy....	\$59,332,503	\$50,669,440	17.1
Value of products‡	\$283,336,884	\$181,258,087	56.3
Horsepower rating of power equipment:			
Total.....	701,214	523,591	33.9
Per wage earner.....	15.8	12.0	...
Ratio of expenses (supplies, fuel, etc.) to value of products	20.9	28.0	...

* Number of "enterprises" represents number of reports received. In some cases a report covers an individual mine and in others a group of mines. A company operating in several counties was required to furnish a report for operations in each county separately. In some instances a separate report for each mine operated by a company within a single county was received. The number of enterprises is, therefore, somewhat greater than the number of operating companies. (Data for enterprises reporting value of products under \$2,500 are not included.)

† Not including salaried employees. The average number of wage earners is calculated by totaling the numbers reported for the several months of the year (in most cases the number on the pay roll on the 15th) and dividing the sum by 12.

‡ The total value of products is made up as follows: Mine value of metals contained in the ore—copper, \$263,603,919; lead, zinc, gold, and silver, \$18,558,488. Value of other metals and amounts received for power, etc., \$1,174,477.

Bauxite Industry in 1930

Shipments of bauxite from mines in the United States in 1930 were 330,612 long tons, valued at 1,928,297, a decrease of 10 percent in quantity and of 15 percent in total value, as compared with 1929, according to the United States Bureau of Mines.

In Alabama bauxite was produced in 1930 from the Eufaula and "Lennig" mines, in Barbour County, and the Davis Hill No. 3 mine, in Henry County. The shipments were 33 percent less than in 1929, of which 79 percent was shipped for use in the chemical industry and the remainder for use in the abrasive industry.

Bauxite was produced in Georgia in 1930 at the Hatton and "Easterlin" mines, in Sumter County. Shipments from Georgia in 1930 were 136 percent more than in 1929, practically all of which was shipped for use in the chemical industry.

In 1930 bauxite was produced in Arkansas at four mines—the Sweet Home and Dixie No. 2, in Pulaski County, and the Bauxite and Superior mines, in Saline County. Shipments of bauxite from Arkansas in 1930 were 315,273 long tons, a decrease of 10 percent from 1929. The main production originated in the Saline County field, in which there was a decrease of 5 percent. The mines in Pulaski County shipped 30 percent less bauxite in 1930 than in 1929. The shipments from Arkansas were mainly for use in the aluminum industry, followed in order by the abrasives, chemical, and refractories industries.

The producers of domestic bauxite reported sales during 1930 at prices ranging from \$5 to \$14.12 a long ton. The average for Arkansas bauxite was \$5.78 a ton, for Alabama \$7.67, and for the United States \$5.83. Probably the values reported to the Bureau of Mines by most operators represent nearly production costs, as the greater part of the domestic bauxite is produced by consumers.

WINNERS OF SAFETY COMPETITION ANNOUNCED

The remarkable growth of the safety movement in the mining and allied industries is again demonstrated by the awards just made to a large number of mines and quarries participating in the National Safety Competition for 1930 in recognition of the long-time operation of their properties with no accidents or with decidedly low accident rates.

The trophy for the anthracite group was awarded to the Tomhicken mine of Coxe Bros. and Co., Inc., at Jeddo, Pa., which worked 458,208 man hours with but 47 lost-time accidents causing 417 days of disability.

In the bituminous mine group, the trophy was awarded to the Penn Central Mine No. 1 of the Penn Central Light and Power Co., near Coalmont, Pa., which worked 211,760 man hours with only 4 lost-time accidents causing 39 days of disability.

The trophy winner in the metal mine group was the West Vulcan iron mine of the Penn Iron Mining Co., Vulcan, Mich., which worked 318,402 man hours without a single lost-time accident.

In the non-metallic mine group, the trophy was awarded to the Lower gypsum mine of the United States Gypsum Co., Vulcan, Mich., which worked 318,402 man hours without a single lost-time accident.

The winner in the quarry and open-cut mine group was the Plymouth iron mine of the Plymouth Mining Co., Wakefield, Mich., which worked 382,541 man hours without a lost-time accident.

In the anthracite group, honorable mention was given the Highland No. 6 mine of the Jeddo-Highland Coal Company, Jeddo, Pa., which worked 128,040 man hours with 6 lost-time accidents causing 118 days of disability; the Beaver Meadow mine of Coxe Bros. & Co., Inc., Beaver Meadow, Pa., working 817,072 hours with 33 accidents entailing 820 days disability; the Jeddo No. 4 mine of the Jeddo-Highland Coal Co., Jeddo, Pa., working 2,430,768 hours with 180 accidents involving 2,495 days disability; and the Highland No. 2 mine of the Jeddo-Highland Coal Co., Jeddo, Pa., working 343,392 hours with 21 accidents and 493 days of disability.

The following operations in the bituminous group were given honorable mention; Hull mine of the DeBardeleben Coal Corp., at Dora, Ala., which worked 470,680 man hours with 1 lost-time accident causing 90 days of disability; Seger No. 1 mine of the Seger Bros. Coal Co., Derry, Pa., working 219,808 hours with 5 accidents causing 70 days of disability; Humphreys mine of the Humphreys Coal and Coke Co., Greensburg, Pa., working 166,840 hours with 3 accidents involving 74 days disability; and to the Dawson

No. 2 mine of the Phelps Dodge Corp., Dawson, N. Mex., which worked 93,704 hours with 2 accidents causing 54 days of disability.

Honorable mention in the metal mine group was given to the following-named operations: the Berkshire iron mine of the Brule Mining Co., Stambaugh, Mich., working 283,807 man hours with no accidents; the Wilbur zinc and lead mine of the Commerce Mining and Royalty Co., Cherokee, Kans., working 217,080 hours with no accidents; the James iron mine of the James Mining Co., Iron River, Mich., working 157,891 hours without an accident; the West Side zinc and lead mine, of the Commerce Mining and Royalty Co., Cherokee County, Kans., working 146,066 hours with no accidents; and to the Scammon Hill zinc and lead mine of the Commerce Mining and Royalty Co., Commerce, Okla., which worked 122,701 hours without an accident.

In the open pit group, 62 operations worked the entire without a lost-time accident, the man hours worked ranging from 30,114 to 331,367.

Honorable mention in the non-metallic group was given to the Wampum limestone mine of the Crescent Portland Cement Co., Wampum, Pa., which worked 100,687 man hours without a lost-time accident; the Akron gypsum mine of the Universal Gypsum and Lime Co., Akron, N. Y., working 64,647 hours with no accidents; the Retsof rock salt mine of the Retsof Mining Co., Retsof, N. Y., working 307,214 hours with but 1 accident causing 55 days of disability; and to the No. 6 gypsum mine of the United States Gypsum Co., Plasterco, Va., which worked 151,401 hours with 3 accidents causing 62 days disability.

The National Safety Competition is conducted annually by the United States Bureau of Mines. In letters addressed to the companies receiving trophies and to those given honorable mention, Scott Turner, Director of the Bureau of Mines, states that an annually increasing number of companies are succeeding in operating their properties with unusually favorable records in the prevention of accidents. The National Safety Competition, he stated, is proving a very effective safety movement largely because its competitive features have a strong appeal both to mining companies and their employees.

More than 300 large operations participated in the competition during 1930. Seventy-two of these went through the year without a single lost-time accident. Contestants were divided into 5 groups, 4 of them comprising underground operations, as follows: anthracite, bituminous coal, metallic ore, and non-metallic mineral; and the fifth including quarries or

open-cut mines. A replica of the bronze trophy, "The Sentinels of Safety," donated by the *Explosives Engineer Magazine*, was awarded to the winner in each group.

BOOK REVIEWS

HANDBOOK FOR PROSPECTORS, by M. W. von Bernewitz, has recently been published by the McGraw-Hill Book Co., Inc., in a new, thoroughly revised and enlarged second edition, covering latest advances in methods and data. It is planned as a complete, modern guidebook for the mining engineer engaged in field work, and presents both the scientific and practical data needed by the prospector. The book is divided into four parts under the following general headings: (1) introductory, equipment, laws pertaining to mining, etc.; (2) mineralogy, geology, field methods, markets; (3) minerals, occurrence, description, detection and use; (4) prospecting by geophysical methods. An important feature of this new edition is the full explanation of geophysics as applied to prospecting, given in the simplest possible manner. There are 359 pages (5x7½) and 89 illustrations. Price \$3.

A. T. Shurick, consulting mining engineer, of New York, has prepared a compilation of graphs on coal, in pocket size, covering both anthracite and bituminous, under weekly production and movement; yearly and weekly prices; monthly costs—consumption and stocks both monthly, annual and seasonal; curves on production by states, nations and consumers; and a series treating of operations, economics, coal substitutes, with water power, gas, and oil data; and a record of coal securities.

The pocket volume, copyrighted by Mr. Shurick as "Job No. 102," sells at \$12 and offers a handy reference work on coal for almost any statistical or comparative purpose.

Production of Potash in 1930

Potash produced in the United States in 1930 amounted to 105,810 short tons of potassium salts equivalent to 61,270 short tons of potash (K₂O), according to the Bureau of Mines. Sales by producers amounted to 98,280 tons of potassium salts with an equivalent of 56,610 tons of K₂O. The potash materials of domestic origin, sold by producers in 1930, were valued at \$2,986,157 f. o. b. plants. About 20,550 tons of potassium salts with an available content of 10,800 tons of K₂O, remained in producers' stocks December 31, 1930. The output decreased 2 percent in gross weight with

a decrease of less than 1 percent of K_2O content. The sales of salts decreased 3 percent with a decrease of 1.6 percent in K_2O content. The total value of the sales decreased less than 1 percent. More crude salts remained in the hands of producers at the end of 1930 than at the end of 1929. The production was chiefly from natural brines in California and distillery residue from molasses in Maryland. Alunite was shipped from Sulphur, Nev., to California, ground and sold as fertilizer, and a small amount was also produced at Marysville, Utah, for use in experimental work. Cotton boll ash was also sold as a fertilizer based on its content of water soluble K_2O .

The potassium salts imported for consumption into the United States in 1930, according to the Bureau of Foreign and Domestic Commerce, amounted to 978,974 short tons. The estimated K_2O equivalent of these imports is 342,071 short tons. This represents an increase of 5 percent in gross weight over the imports for 1929. The total value of the imports was \$24,478,087, which was 3 percent more than in 1929.

Production of Coal in April

The total production of bituminous coal for the country as a whole during the month of April is estimated by the Bureau of Mines, at 28,478,000 net tons, a decrease of 5,392,000 tons, or 15.9 percent, from the March output. The number of working days in the two months was approximately the same—25.8 days in April as against 26 days in March. The average daily rate of output in April was 1,104,000 tons; in March, 1,303,000 tons.

Anthracyte production in Pennsylvania increased in April. The total for the month is estimated at 5,700,000 net tons, a gain of 955,000 tons, or 20.1 percent, over the March output. Since the number of working days in the anthracite fields in April is but 25 as against 26 in March, the daily rate of output is a better measure of trend. The average daily rate for April—232,300 tons—shows an increase of 27.3 percent over the rate of 182,500 tons in March.

Magnesium in 1930

The domestic output of new magnesium ingot decreased from 1,329,669 pounds in 1929 to 1,173,557 pounds in 1930, according to reports furnished by producers to the Bureau of Mines. Though failing to equal the high record in the production and sales of magnesium in 1929, the industry did register an increase as compared with 1928 and previous years. The output of new ingot was considerably more than double the 1928 output and only 12 percent less than the 1929 figure. The quantity of

magnesium ingot sold or used in 1930, 559,631 pounds valued at \$268,864, although scarcely two-thirds of the 1929 volume, compares favorably with the corresponding quantity, 530,782 pounds valued at \$289,658, for 1928.

During the last three years the domestic output of primary magnesium has been all obtained from magnesium chloride recovered as one of the many co-products of the extensive industry based on the brine wells of Midland, Mich.

Two substantial price reductions in ingot magnesium were made in 1930. In January the price was 80 cents a pound for lots of 5,000 pounds or over and \$1 a pound for 100-pound lots; from February through November the prices were 65 to 80 cents, and in December the price for ordinary quantities, 100-pound lots or over, was cut to 48 cents a pound with additional discounts on large contract orders.

Commercial Stocks of Anthracite and Bituminous Coal

Bituminous coal.—Consumers' stocks of bituminous coal declined steadily during the first quarter of 1931 and on April 1 amounted to 29,500,000 tons, according to the Bureau of Mines. On January 1, the date of the last survey, there was 37,200,000 tons in storage. During the month of January there was a net decrease of 3,000,000 tons, leaving a balance of 34,200,000 tons on hand on February 1. From February 1 to April 1 there was a further reduction of 4,700,000 tons. Thus the total withdrawn from storage during the first quarter of the year was 7,700,000 tons and, for the first time in nearly a decade, the commercial reserves are less than 30,000,000 tons.

A slight decrease occurred in the rate of consumption during the first quarter of 1931, reflecting in part the reduced rate of industrial activity and in part the unusually mild weather that prevailed over most of the country. The average weekly rate of consumption during the first three months of the year was 8,868,000 tons. Exports averaged 175,000 tons, and the total consumption plus exports was 9,043,000 tons. In comparison with the new previous quarter, the rate of home consumption shows a decrease of 1.3 percent and is 15.0 percent less than in the corresponding period of last year.

Although stocks on April 1 were at the lowest level in many years, it should be remembered that, with the close of the heating season, the rate of consumption declines abruptly. Last year, for example, with industry in general much more active than at present, the average rate of consumption in the second quarter was 27 percent less than in the first quarter.

Retail anthracite.—Stocks of anthracite in retail yards on April 1 show the usual seasonal decline, being 38 percent under those on hand January 1. They are also considerably less than on the same date last year.

BITUMINOUS STOCKS BY CLASSES OF CONSUMERS

During the past 12 months consumers' stocks of bituminous coal have been reduced by 3,600,000 tons. This decline was shared by each of the principal consumer groups, and ranged from 5.8 percent for the coal gas plants to 17.4 percent for the general industrial plants (other than steel and coke works). In spite of this general reduction the reserves on April 1, in terms of days' supply, were actually a little greater than on the corresponding date of last year because of the lower rate of consumption.

At the rate of consumption prevailing in February and March, the stocks on April 1 were sufficient to last 24 days if evenly divided. Stocks are never evenly distributed, however, and there were wide variations between individual consumers. The largest reserves on April 1 were held by the coal gas plants, which reported an average of 59 days.

By-product coke and steel works.—Stocks at both by-product coke plants and steel works have decreased during the last three months. Complete returns from the by-product plants show a total of 3,982,981 tons of coking coal in storage on April 1, of which 2,921,381 tons was high volatile and 1,061,600 tons was low volatile. The steel works and rolling mills reported 635,369 tons of steam coal and 535,538 tons of gas coal, a total of 1,170,907 tons.

Railroad fuel.—Stocks of railroad coal also declined sharply during the first quarter of 1931. According to the American Railway Association, the total reserves held by railroads on April 1 amounted to 5,675,000 tons. In comparison with the quantity on hand at the first of the year, this is a decrease of 1,398,000 tons, and is the smallest tonnage the railroads have had in storage since December 1, 1922.

At the rate of consumption prevailing in the first quarter of the year, the stocks held by the railroads on April 1 were sufficient to last 20 days. By railroad regions, the supplies were as follows: New England, 23 days; Great Lakes, 17 days; Central Eastern, 11 days; Pocahontas, 14 days; Southern, 16 days; Northwestern, 56 days; Central Western, 16 days; and Southwestern, 8 days.

BITUMINOUS COAL IN TRANSIT

Coal brought to the surface, prepared for the market, but not yet delivered to a consumer, may be considered "in transit." The largest element in the

quantity in transit is, of course, the coal moving in railroad cars, which has never been accurately measured but runs into several million tons. The quantity of such coal, however, varies in direct ratio to production, and from current reports of car loadings it is evident that the amount of coal on wheels on April 1 was considerably less than at the beginning of the previous quarter.

Unbilled coal at the mines.—Another important item in the reserves in transit is the coal in cars unbilled at mines or in classification yards. A certain number of unbilled loads may be considered part of the normal reserves, but in recent months the number of no bills have been unusually high. On April 1 the American Railway Association reported a total of 1,720,000 tons of unbilled coal on wheels waiting shipment. In comparison with January 1 this is an increase of 172,000 tons, but is 276,000 tons more than on the same date last year.

Mine storage.—The few bituminous operators who follow the practice of storing at the mines or at intermediate points reported 338,000 tons on hand April 1 as compared with 557,000 tons on January 1.

Coal on the Upper Lake Docks.—The stocks held by the lake dock operators may also be considered in transit. On April 1 the quantity of bituminous coal in storage at the commercial docks on Lake Superior and Lake Michigan amounted to 4,747,000 tons as compared with 3,779,000 tons on the same date a year ago.

Coal in retail yards.—Stocks of both anthracite and bituminous coal in the hands of retail dealers on April 1 show the usual seasonal decline, in spite of the extremely mild weather that prevailed over most of the country during the first quarter of 1931. Since the first of the year anthracite stocks have been reduced by 38 percent. The present stocks are also considerably less than on the corresponding dates of other recent years. At the rate the householders were calling for hard coal in February and March, the stocks on April 1 were sufficient to last only 21 days.

It was not feasible to canvass all retailers, but information was obtained from a representative group of 870 dealers scattered throughout the country, who are believed to be typical. Of these dealers there were 462 handling anthracite and 760 handling bituminous coal, who have reported at every one of the stock surveys since 1919.

Retail stocks of bituminous coal have declined even more rapidly than anthracite since the first of the year. In comparison with the quantity of bituminous coal in retail yards three months ago, the tonnage on hand April 1 shows a decrease of nearly 43 percent. At the rate of delivery in February and March, the stocks on hand at the beginning of

the new coal year were sufficient to last 15 days as against a supply equivalent to 16 days requirements on April 1, 1930.

Retail dealers' stocks of coke.—Of the 870 representative retail dealers reporting, there were 485 dealers located in 38 states who handled coke. The quantity of coke delivered to their consumers was 4.8 percent of their total deliveries of solid fuel during the months of February and March. Reports from these dealers indicate that their stocks were sufficient to last 13 days at the rate consumers were buying coke in February and March.

Producers' stocks of coke.—On April 1 the total stocks of by-product coke in the hands of producers amounted to 2,824,752 tons. Of this amount, however, 1,495,882 tons was carried by plants affiliated with the iron furnaces, which ordinarily sell very little coke for domestic purposes. The quantity in storage at merchant plants on April 1 was 1,328,870 tons. On the same date last year the total stocks of coke amounted to 1,992,773 tons, of which 905,468 tons was at merchant plants and 1,087,305 tons at furnace plants. Details concerning stocks of by-product coke were published by the Bureau of Mines in Monthly Coke Report No. 37, which will be supplied on request.

Anthracite on the Upper Lake Docks.—Stocks of anthracite held by commercial dock operators at the head of the Lakes on April 1 amounted to 478,846 tons. This is somewhat more than the tonnage on hand a year ago.

Alabama Mining Institute and Chief Mine Inspector Honored

At a large and enthusiastic meeting of the Alabama Mining Institute, held in Birmingham on the 18th of May, the certificates of honor awarded by the Joseph A. Holmes Safety Association to the Alabama Mining Institute and to W. B. Hillhouse, chief state mine inspector, were presented by Dan Harrington, chief engineer of the Safety Division of the U. S. Bureau of Mines. D. A. Thomas, president of the Alabama Council of the Holmes Safety Association, presided. Mr. Harrington first presented the certificate of honor to the Alabama Mining Institute, reviewing the remarkable safety record of Alabama on which the award of the certificate was based. Erskine Ramsay, chairman of the Mine Casualty and Mining Institute Committee of the Alabama Mining Institute, responded and accepted the certificate on behalf of the Institute. Mr. Harrington then presented a certificate to W. B. Hillhouse, chief mine inspector of Alabama, pointing out that this was the first instance in which such recognition had been given by the Jos. A. Holmes Safety Association to anyone occupying an official position in a state mining depart-

ment. The remarkable safety achievement of the Alabama coal mining industry under Mr. Hillhouse's inspiring leadership was fully described. In the course of his presentation speech he recited the fact that there are now 30 active chapters of the Holmes Safety Association in Alabama, 15 white and 15 colored.

Mr. Hillhouse's address in accepting the certificate of honor was largely a tribute to the wholehearted support that he had received from the Alabama Mining Institute and from individual mine operators. The striking keynote of the entire ceremony was the sympathetic recognition by each speaker of the essential contribution to the remarkable state record contributed by the wholehearted cooperation of the individual operators, the Institute, the State Mine Inspector's Department and the U. S. Bureau of Mines.

After the presentation ceremonies, Allan H. Willett, director of the Bureau of Coal Economics of the National Coal Association, explained the aims of the National in its safety work, pointing out that it hoped to serve as a center of information and inspiration for the safety movement, but neither expected nor desired to impose its ideas upon the local groups on whose activities the success of the safety movement in any field must depend.

On the afternoon of Tuesday, May 19, another certificate of honor to the Alabama mining industry was presented. This was the certificate awarded by the Jos. A. Holmes Safety Association to the Hull mine of the DeBardeleben Coal Corporation for having operated 11 months and 20 days without a single lost-time accident. Milton H. Fies, vice president of the DeBardeleben Coal Corporation, presided. The presentation was made by Mr. Harrington and accepted by Henry T. DeBardeleben on behalf of his company. This is the third recognition won by the DeBardeleben Coal Corporation within three years. It was awarded the Sentinels of Safety trophy by the *Explosives Engineer* because of having the best coal mine safety record in 1929, and was also awarded a certificate of honor by the Jos. A. Holmes Safety Association for its record at that time.

Mine Inspectors Institute Holds Annual Meeting

At the annual meeting of the Mine Inspectors' Institute of America, held early in May in Richmond, Va., the following officers were chosen: President, Ed. Flynn, chief safety inspector (coal mines), Tennessee Coal, Iron & Railroad Company, Pratt City, Ala.; first vice president, John F. Daniel, chief, department of mines of Kentucky; second vice president, P. J. Friel, mine inspector of

Pennsylvania; third vice president, John G. Millhouse, director of the department of mines and minerals of Illinois; secretary, C. A. McDowell, safety engineer, Pittsburgh Coal Company, Pittsburgh, Pa.; assistant secretary, Thomas Stockdale, mine inspector of West Virginia; and Treasurer, J. J. Rutledge, chief engineer, Maryland Bureau of Mines. John C. Kennedy, safety engineer, National Coal Association, briefly outlined the safety campaign of the Association.

Perfect Safety Records for Two Phelps Dodge Branches for April

Perfect records for safety were turned in by the Moctezuma and Morenci Branches of the Phelps Dodge Corporation for April and the two branches tied for first place in the company's safety contest.

The Copper Queen Branch was second with one time-lost mishap, the Stag Canon third with one, and the Old Dominion last with four. Only six lost-time accidents were chalked up against the five branches during April.

All six accidents also occurred in the underground mining department, the other departments of activity showing clean slates for the month.

Continental Coal Company Signs Wage Agreement With Union

H. W. Showalter, of Fairmont, W. Va., president of the Continental Coal Company, gave out the following statement on May 30:

"Mines of the Continental Coal Company in the Fairmont and Morgantown districts of West Virginia will commence operations June 1st on an agreement with the United Mine Workers of America. The agreement, however, is not of the character formerly in effect between the United Mine Workers and mine operators in northern West Virginia. It was signed by the Continental Coal Company after their wishes in the matter had been ascertained. Clauses in prior contracts which were objectionable to mine operators and tended to make discipline and operation difficult have been omitted. We believe the present form of contract will be an aide to operation, instead of a detriment to it, will assist in stabilizing the wage situation, and in addition is a step towards stabilizing the industry generally."

On May 20th The M. A. Hanna Company and The Susquehanna Collieries Company enter their new offices, 8th floor of the Board Street Station Building, Pennsylvania Boulevard and the Parkway, Philadelphia. Their former headquarters were located in the Commercial Trust Building, Philadelphia.

Junior Coal Division to Discuss "Sludge"

The Pittsburgh Junior Branch of the Coal Division of the American Institute of Mining and Metallurgical Engineers will meet June 8, 1931, in the William Penn Hotel, Pittsburgh, to consider modern treatment and recovery of fine coal from washery operations. The meeting will be largely an open discussion on all practical and experimental development up to the present time in the economic solution of the "sludge" problem, and all those interested in modern coal preparation should make it a point to attend.

J. B. Morrow, Preparation Manager of the Pittsburgh Coal Company, will deliver an historical outline of the factors involved in settling, filtering, heat-drying, froth-flotation, and other handling methods, and his paper will be used to guide the discussions.

Midwest Coal Industry Confers at University of Illinois

Producers, distributors and consumers of coal in large number, together with representatives of the carriers, gathered at the University of Illinois, Urbana, May 21 and 22, to participate in the Second Midwest Bituminous Coal Conference, held under the auspices of Illinois and Purdue Universities. The conference largely had to do with the value of midwest coal and its domestic and industrial utilization. A program covering papers of interest and value was arranged by Jonas Waffle, Managing Director, Coal Trade Association of Indiana, and B. R. Gebhart of the Illinois Coal Bureau.

FURTHERING COAL UTILIZATION

(From page 315)

make up our minds that raggedness is one of life's necessary evils.

Let's not do that. Let's admit that we were asleep at the switch. Let's grant that we have spent too much time rolling our cigarettes and too little time developing new smokers. Let's confess that we have brought most of our troubles on ourselves by our reversed mental attitude. If we only get that far, we shall be well started on the road to recovery.

Well, in the first place, whose job is it to make the first move? Ask any group of three retailers and one is sure to break out with the exclamation, "The operators ought to do something about it!" I suspect you are tired of hearing it. But isn't there some justification for it? In every other field of production and distribution the producer leads the merchandising parade. He probably does it for selfish reasons, but he does it. His units are bigger and he can afford to hire and pay for better brains to plan and direct the attack. When the plans are made they can be put into effect over his entire market, which must of necessity cover a wider geographical territory.

Don't get the idea that I believe we

retailers should sit back and do nothing. As a matter of fact I have no such idea. I merely claim that you should be better equipped than we should be expected to be, to formulate and lead such a plan. As a matter of actual fact I believe that the most of what little has been done to date in the way of cooperative effort toward better merchandising has been led, and in some cases actually directed, by retailers. The difficulty in the way of faster progress among our folks is the great number of small units whose directing heads must be pulled down off the wagon-box and put behind the selling counter. Every time we make a convert we have improved the retail merchandising picture by 1/46000 of the whole. On the other hand, every time one of you fellows gets religion, a much larger fraction of your army gets into step.

One of the interesting features of the thing is this: few converts can really be made. After a man's mind has been operating along a certain course for the better part of his business lifetime, whether it's down in a hole or up on a wagon-box, it's pretty likely to maintain that course from then on. The new ideas in the industry are being brought in by new people. They are bringing in plans that they have proven in other fields and are putting them to work in the coal business. They have no preconceived notions to overcome about the importance of the operations below ground or the number of times a week an axle must be greased.

They have come into the picture because they have shown that they could sell two gadgets where one gadget could be sold before. They believe that the same principles that increased consumer-acceptance of gadgets can be made to increase consumer-acceptance of coal. And in many cases they are proving it. There is nothing to prove that a wizard at production or transportation should be expected to prove to be a wizard at mass-selling; on the contrary, all evidence points the other way. Of course, when production was the main problem the production man had a right to be king. Now that it no longer is the problem, the economic revolution will force his abdication, either through the kind offices of the sheriff or some other way.

In the meantime while the revolution is going on let me ask a few favors of you gentlemen who are charged mainly with the production problem. Quit looking upon your sales departments and your retail outlets as a bunch of impractical lunatics who must be tolerated as a necessary evil. Listen to their complaints and suggestions. Quit looking upon your retail tonnage as a by-product—something that you have left to get rid of after 80 percent of your product is on wheels. After all, the 20 percent we handle is what buys the breakfast food that goes on your table: if you don't believe it, try crushing your retail sizes and sell 'em all for steam purposes and see where you end up. Forget, for a moment, the past glories of the coal business. Erase your memories. Assume that we have a new product that the consuming public never heard of. Take the lead in discovering and developing new markets. Give us poor peddlers something to inspire our imagination and arouse our enthusiasm. There is a growing minority of us who can develop quite a bit of power if you furnish the spark.

WITH THE MANUFACTURERS

Neil E. Salsich New Jeffrey Vice President and Sales Manager

At a recent meeting of the board of directors, Neil E. Salsich was elected to the position of vice president and general sales manager of The Jeffrey Manufacturing Company, Columbus, Ohio. In assuming his new responsibilities Mr. Salsich brings to the Jeffrey Company a rich sales experience and a dynamic personality.

Prior to joining the Jeffrey organization, Mr. Salsich was associated with the



Bethlehem Steel Company as manager of railroad and mining sales.

He served in various capacities in the operating and sales departments at the Steelton plant; Boston, Chicago, and Philadelphia sales offices; and at the home office, Bethlehem, Pa.

As manager of railroad and mining sales, Mr. Salsich became closely associated with the steam and street railroads, and with coal and metal mines. He was particularly interested in special track work and served on the committee of the American Electric Railway Association assigned to this subject.

In his new position with the Jeffrey Company, Mr. Salsich will be able to continue his association with these industries as many Jeffrey products including conveying, reduction, mining, and ventilating equipment are extensively used by them.

The Jeffrey Manufacturing Company, in addition to its main plant at Columbus, Ohio, operates the following subsidiary companies: The Ohio Malleable Iron Co., Columbus, Ohio; The Galion

Iron Works & Mfg. Co., Galion, Ohio; Jeffrey Mfg. Co., Ltd., Montreal, Canada, and the British-Jeffrey Diamond Co., Wakefield, England.

Shunk Succeeds Farnham

The Goodman Manufacturing Company announces the appointment of Mr. Walter C. Shunk as mining engineer with office at the factory, 4834 South Halsted Street, Chicago. Mr. Shunk succeeds the late Sidney W. Farnham.

American Rolling Mill Co. Appoints Research Assistant

R. F. Mehl, superintendent of the division of physical metallurgy of the Naval Research Laboratory, has been appointed assistant director of research of the American Rolling Mill Company, Middletown, Ohio. He will be in charge of the physical science department of the Armco laboratories, and will take up his new responsibilities September 1. He has been one of the research consultants for this company for the past 18 months.

As the author of numerous papers Mehl's work has attracted considerable attention. The subjects upon which he has written are: Preparation of pure alloys, aluminum-magnesium alloys, vacuum apparatus, refractories, compressibility of alloys, compressibility of tellurium, crystal structure and constitution of cadmium-mercury alloys, interatomic forces and cohesion in metals and alloys, crystal structure of the alpha copper-tin alloys and several papers on the Widmanstätten structures in alloys, and radiography by the use of the gamma rays. He is also the translator of Professor Tammann's "States of Aggregation," by D. Van Nostrand, 1925.

J. C. McQuiston Retires from Westinghouse Company

J. C. McQuiston, general advertising manager of the Westinghouse Electric and Manufacturing Company, has announced his retirement effective June 1, 1931. Mr. McQuiston is probably the best known advertising executive in America.

In his decision to retire from Westinghouse he brings to an end a record of continuous advertising administration for one company unparalleled in American

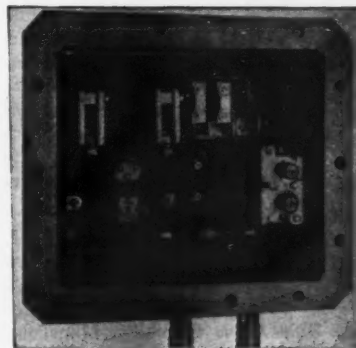
industry. For 29 years Mr. McQuiston has been in charge of advertising for Westinghouse Electric during which time the status of advertising and sales promotion, distribution and other allied phases of his profession have gone through as many changes as the electrical industry itself.

His position in radio broadcasting is unique in that he is the only advertising man privileged to have been a member of the original council of Westinghouse executives who decided to inaugurate broadcasting and who laid down the policies and practices to be followed.

As an advertising man, Mr. McQuiston has left the imprint of his personality on every branch of his profession. During his career he has been responsible for expenditures totalling scores of millions of dollars in every form of advertising media. As president of the Association of National Advertisers and as a leader in associational work in the electrical and allied industries he is perhaps better known personally to more members of the electrical world than any other man within it.

Westinghouse Explosion-Tested 5-hp. Linestarter

The Westinghouse Electric and Manufacturing Company announces a new (explosion-tested) magnetic starter recently developed for linestarting 1 to 5 hp., 230 and 550 volt motors on applications requiring the U. S. Bureau of



Mines approval as "Permissible" equipment.

Inverse time limit overload protection is supplied by a thermal overload relay with characteristics which permit the short high current peaks caused by line-

starting and still be accurate and sensitive to any overloads of long duration. The time saving feature of automatic reset is supplied on this relay.

Fused short circuit protection is obtained by a fuse connected in the positive lead.

Low voltage protection which prevents unexpected or unsupervised starting is provided on these linestarters.

The "start" and "stop" push button unit is mounted in the case and operated by plungers from the front.

The light weight explosion-proof compartment is made from $\frac{1}{4}$ in. to $\frac{3}{8}$ in. rolled sheet steel and has overall dimensions, including the outside flange, of $13\frac{1}{2}$ in. by $15\frac{1}{2}$ in. by 8 in.

The electrical circuit is broken by a two-pole magnetic contactor which has an arc rupturing capacity of 150 amps. at 500 to 550 volts, when totally enclosed in a permissible compartment.

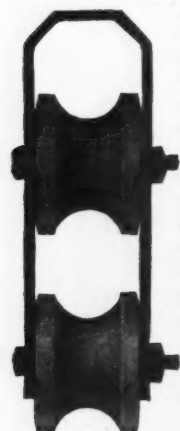
This starter has passed the Bureau of Mines test for "permissible" or "explosion-tested" equipment and their adequacy test for application up to and including 5 hp. continuous rated motors.

The Westinghouse Company has also developed a line of 230 and 500 volt explosion-tested motors to be used in conjunction with this starter.

Feeder Cable Support for Heavy Service in Mines

Due to demands brought about by greater developments in mine electrification, the O-B Type C feeder insulator has been made available in the 2-spool design for the accommodation of 500,000 c.m. cable.

Similar to other models of this device, this new addition to the O-B line is suspended from the mine roof by a single expansion bolt. The steel yoke is of ample strength and the spools are of dense porcelain. These factors are combined to produce a device that will meet the demands placed upon such equipment over long periods of hard service.



The new 2-spool, Type C feeder wire insulator for 500,000 c.m. cable is a product of the Ohio Brass Company, Mansfield, Ohio.

New Coal Cleaning Plants

The following contracts for coal cleaning plants and equipment have recently been closed by the Roberts and Schaefer Company, of Chicago:

Kingston Pocahontas Coal Company,

Springton, W. Va.—Hydro Separator coal washing equipment for washing and sizing pea and stove coals. Capacity 150 tons per hour. To be completed June 1, 1931.

Mallory coal company, Huntington, W. Va.—Hydro Separator coal washing equipment for washing and sizing pea and stove coal. Capacity 50 tons per hour. To be erected at Mine No. 3, Mallory, W. Va. To be completed June 1, 1931.

Mallory Coal Company, Huntington, W. Va.—Hydro Separator coal washing equipment for washing and sizing pea and stove coals. Capacity 50 tons per hour. To be erected at No. 2 Mine, Landville, W. Va. To be completed June 1, 1931.

Westmoreland Coal Company, Irwin, Pa.—Complete Hydro Separator coal washing and screening plant to be erected at Hutchinson Mine. Capacity 350 tons per hour handling 3" screenings. To be completed September 1, 1931.

Ingersoll-Rand to Supply Compressors and Rock Drills for Hoover Dam

Six Companies, Inc., the contractors, who will build the Hoover Dam, have placed orders with Ingersoll-Rand Company for all air compressor and rock drilling equipment that will be required for this record breaking five-year project.

The stationary air plant will consist of a battery of large class "PRE" type direct-connected, electric-driven compressors having a combined output of 5,000 cu. ft. per minute.

These compressors will supply air for driving the four diversion tunnels that will carry the waters of the Colorado River through the canyon walls around the dam site while the dam proper is being built. Work will start immediately upon these tunnels.

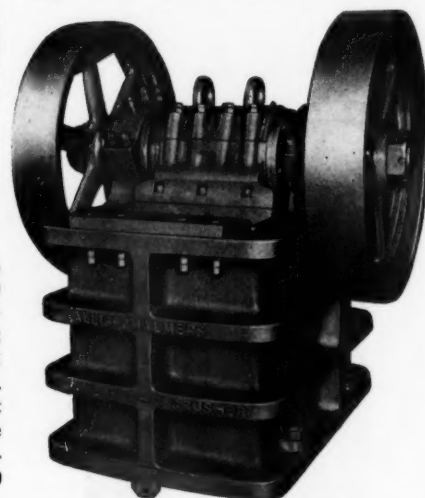
These tunnels are interesting as constituting the largest rock tunnels ever to be driven for comparable distances. Each of them will be 57 ft. in diameter, about seven times as great in cross section as such railroad tunnels as the Moffat and Cascade. Each will be a mile long. Four tubes almost the size of the Holland Vehicular Tunnels between New York and New Jersey could be placed in any one of them. A total of 1,563,000 cubic yards of rock will be excavated in driving them.

All told, approximately 5,800,000 cu. yds. of rock will be excavated in connection with the undertaking. Preliminary estimates indicate that about 15,000 miles of drill holes will be required on this phase of the work. Hundreds of tons of drill steel will be literally worn out in penetrating the breccia rock formation that makes up the canyon walls and river bottom.

Fine Reduction Jaw Crusher

Allis-Chalmers Manufacturing Company has developed and is building a new type of jaw crusher for the quantity production of fine material. This crusher, known as the No. 248 Fine Crusher makes it possible, within certain limits of capacity and reduction, to produce in a single operation, a finished product that ordinarily could be obtained only by using a primary crusher followed by a finishing machine such as crushing rolls. This makes it especially suitable for small plants where it is desirable to produce fine stone in one operation.

This crusher is a departure from the design of other types of standard Allis-Chalmers jaw crushers, as it has but one coggle plate and no pitman, the swing



jaw being mounted on the eccentric shaft, from which it receives its reciprocating motion. The simplicity of design, with few working parts, all made of the best materials obtainable, greatly increases the accessibility to all parts of the machine and freedom from expensive delays due to breakdowns. Bearing troubles, so prevalent with crushers subjected to fine reduction work, have been eliminated by the use of roller bearings in the eccentric shaft and frame. The distance between the jaws regulating the size of the finished product is governed by a hand wheel. This adjustment is quickly made by turning the hand wheel and without stopping the machine, changing parts, or using tools.

This crusher is described in Bulletin 1828, a copy of which will be sent on request.

Ingersoll-Rand Solid Injection Diesel Engines is the title of a new bulletin just issued by Ingersoll-Rand Co., 11 Broadway, New York City. It discusses the advantages of diesel power and contains a general description of I-R diesels ranging from 150 to 1,200 horsepower.



Linde Oxygen

Plants and warehouses in all industrial centers make Linde Oxygen, in the familiar grey and green cylinders, available everywhere at minimum transportation cost. Users also benefit from the unique engineering facilities of Linde Process Service.



Prest-O-Lite Acetylene

Prest-O-Lite Dissolved Acetylene . . . the standard for well over a quarter of a century . . . is available from a Prest-O-Lite plant or warehouse near you. Prest-O-Lite is portable, convenient, economical.



Oxweld Apparatus and Supplies

Suitable Oxweld blowpipes, regulators, welding rods and supplies are available for every operation. Complete stocks and service stations are located in all principal cities. Oxweld low-pressure injector type blowpipes, High Test welding rods and other supplies represent maximum values in oxy-acetylene welding and cutting equipment.



Union Carbide

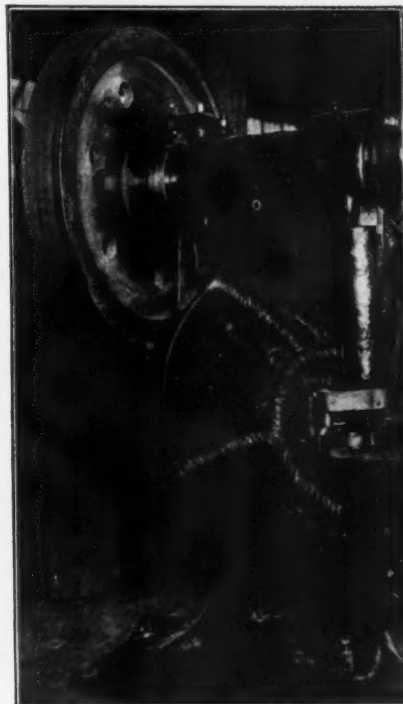
Careful expansion of distributing facilities has made Union Carbide immediately available from over 250 warehouse stocks to every American industry. Sold always in the Blue and Grey drum, it has been the accepted standard for uniform high quality for more than 30 years.



This broken punch press would have brought a few dollars for scrap iron—

but

—oxy-acetylene welding made it as serviceable as a new press and saved a large replacement bill.



Starve your scrap pile ... It eats profits!

Starve your scrap pile by oxwelding new usefulness into tools and machine parts you would ordinarily discard.

Repair small fractures and cracks before they spread. Add to the life of wearing surfaces by applying abrasion-resisting alloy coatings. Many times in emergencies, oxy-acetylene welding and cutting will prevent expensive delays or shutdowns, and save cost and transportation charges of new parts.

Maintenance and repair become simple and practicable with oxwelding equipment. Alert managers find hundreds of uses for it in the course of a year. Possible savings are great—investment and operating costs unbelievably small.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

126 Producing Plants  627 Warehouse Stocks

IN CANADA, DOMINION OXYGEN COMPANY, LTD., TORONTO

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Atlanta	Detroit	New York
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Birmingham	Houston	Pittsburgh
Boston	Indianapolis	St. Louis
Buffalo	Kansas City	Salt Lake City
Chicago	Los Angeles	San Francisco
Cleveland	Milwaukee	Seattle
Denver	Minneapolis	Tulsa
	New Orleans	

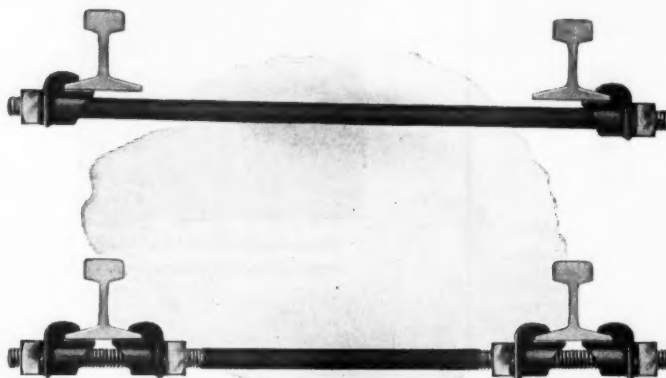
GAUGE RODS

West Virginia Gauge Rods are for use on any track that is difficult to hold to gauge. They are especially valuable when installed on curves. Single jaw type will hold track to gauge. The double jaw type also braces rails against overturning. It is recommended that gauge rods be spaced approximately 12 ft. on medium curves and 6 ft. on heavy curves. Our catalog gives details of the three sizes as well as many further suggestions useful to any one concerned with track work. Write for it.

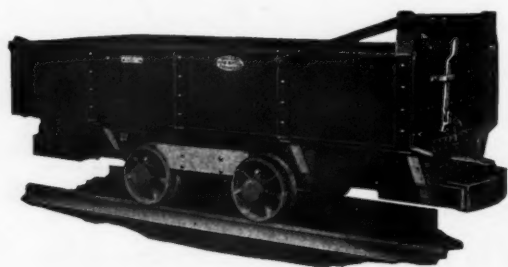
THE
**WEST VIRGINIA
RAIL COMPANY**



HUNTINGTON
WEST VIRGINIA



*Rails and Accessories, Frogs, Switches,
Steel Ties and Special Track Work in
stock for prompt shipment.*



**PHILLIPS
MINE AND MILL SUPPLY
COMPANY**

Pittsburgh, Pa.



Phillips Steel Cars are fabricated over duplicating machines, and interchangeability of replacing parts can always be depended upon. Phillips parts fit Phillips cars!



Write for Prices

I'D LIKE TO RECEIVE MY COPY OF

**CONVENTION
PROCEEDINGS
NUMBER**

THE AMERICAN MINING CONGRESS, 841 MUNSEY BLDG., WASHINGTON, D. C. PLEASE SEND ME MY COMPLIMENTARY COPY OF THE CONVENTION PROCEEDINGS NUMBER OF THE MINING CONGRESS JOURNAL.

NAME _____ TITLE _____

FIRM _____ ADDRESS _____

THIS
ISSUE IS
FREE UPON
REQUEST—SEND
FOR IT TODAY!

THE YEAR'S GREATEST COAL NEWS

AMERICAN STEEL & WIRE COMPANY WIRE ROPE



SO important is wire rope to industry—on excavating machines—on hoists—on elevators—and for a thousand and one purposes—that its users can afford only to specify a brand of proved dependability, economy and long life. Because of its outstanding records—and the known reliability of its maker—American Steel & Wire Company American Wire Rope will be found on most equipment where service requirements are severe.

*Made by the Largest Wire
Rope Manufacturer in the World*

The illustration shows American Wire Rope in use on the world's largest electric shovel.

1831  1931

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION
208 South La Salle Street, Chicago And All Principal Cities
Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco
Export Distributors: United States Steel Products Company, New York

Make This Simple Test



SIMPLEX Cast Iron Pipe is a good mixer.

It fits in almost anywhere. Therefore we suggest this sporting proposition: order a small quantity of Simplex Pipe and when the next break occurs in your pump line, repair it by replacing the exhausted length with a length of Simplex Pipe (it's quickly, easily done). Repeat this replacement as other breaks occur. Keep a check on the service record of these Simplex lengths. You'll undoubtedly find—as other operators have—that Simplex Pipe outlives ordinary black pipe many times over . . . that it is easier, more economical to lay . . . that it makes a tight, flexible line over irregular surfaces, around curves and bends. Sounds too good to be true, doesn't it! But it's a fact. Make this simple test and see for yourself.

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM, ALABAMA
and 1222 Empire Building, Pittsburgh, Pa.



CONNELLSVILLE



CONNELLSVILLE Sheaves have great strength and elasticity. They withstand heavy loads, shocks and stresses. Hub, spokes and main rim are cast in one piece. A hard, locomotive tire steel ring, made IN ONE PIECE fits over a turned position of the rim. A follower, bolted to the main rim, holds this ring in place. This sheave, under unusually hard service, will give 8 to 10 years of service. Steel rope will not cut or rough them. Rope will last longer than on soft steel or cast iron groove.

Bearings are weather proof, oil proof and collar oiling, with removable babbitted shell. Dirt and moisture are excluded. There is flood lubrication of all parts under all conditions. Their superiority has been proven under the worst possible climatic conditions. Send for details of this or any other type of mining machinery.

THE CONNELLSVILLE MFG. & MINE SUPPLY CO.
CONNELLSVILLE, PENNSYLVANIA

Phelps Dodge Corporation

40 WALL STREET

NEW YORK

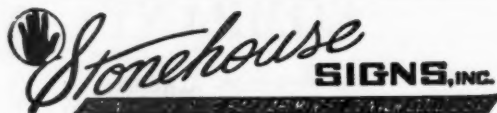
MEMBER COPPER & BRASS RESEARCH ASSOCIATION

COPPER

DIAMOND CORE DRILLING CONTRACTORS

We make Borings for Coal, Clays and all Minerals. Up-to-date Equipment. Gasolene, Steam and Electric Outfits. Ask us for estimates.

MOTT CORE DRILLING COMPANY
HUNTINGTON, W. VA.



Stock and Special Signs, Codes, Etc., for Mines

PATRICK CARBON FOR DIAMOND CORE DRILLING

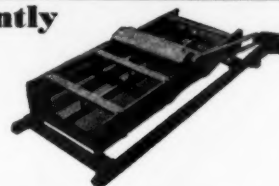
EFFICIENCY and economy in diamond core drilling depend largely upon Carbon quality. Patrick Carbon enjoys world-wide preference because it has proven dependable.

Informative literature free upon request

R. S. PATRICK

Sellwood Building—Duluth—Minnesota—U.S.A.
Carbon Activated—Explosives—Duluth

**"operated constantly
16 hours daily
—no signs
of wear"**



Nothing complicated about Universals, high efficiency, low costs—here are the reasons for such records.

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UNIVERSAL VIBRATING SCREEN CO.

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The RADIORE COMPANY Ltd.

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DIAMOND CORE DRILLING

CONTRACTORS

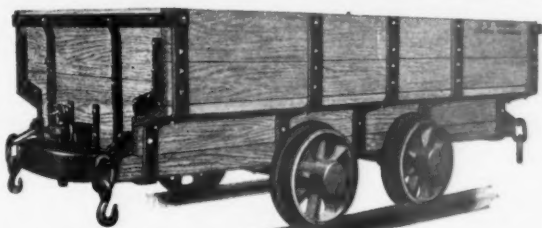
PROSPECTING FOR ANY MINERAL. MORE THAN 20 YEARS EXPERIENCE. SATISFACTION GUARANTEED.



We Look Into the Earth
By using Diamond Core Drills. We prospect Coal and Mineral Lands in any part of North or South America.

Pennsylvania Drilling Co.
Pittsburgh, Pa.
Drilling Contractors

CARD CARS



A great car for heavy slopes, note safety chains

FOR 38 years we've been studying why cars get into repair shops and onto scrap heaps. As a result of that experience, we build cars which lick forty-seven kinds of trouble. Result: CARD CARS STAY ON THE JOB!

Write for Catalog J

C.S. Card Iron Works Co.
Denver, Colorado.

AYER & LORD TIE Co.

A Division of The Wood Preserving Corporation

RAILWAY EXCHANGE

CHICAGO

Railroad Cross

Ties — Timber

Products — Lum-

ber—Poles—Pil-

ing—Fence Posts

Wood Treatments

and Preservation

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Grenada, Miss.,

Louisville, Ky.,

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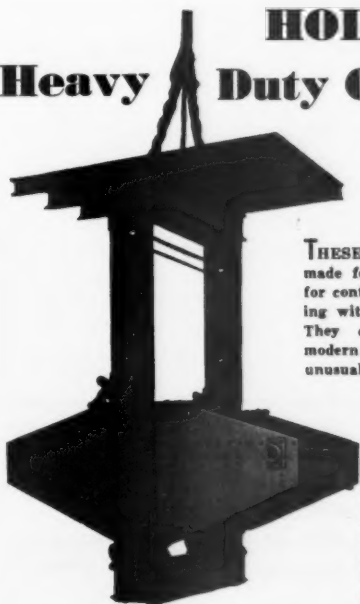
Ark., Montgomery,

Ala.; Marine Ways

Paducah, Ky.

"Creosote Oil Prevents Decay"

HOLMES Heavy Duty Cages

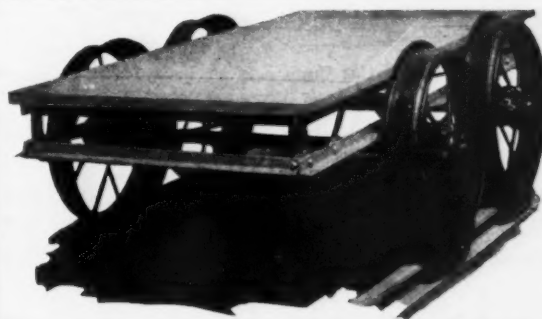


THESE all steel cages are made for heavy loads and for continuous, rapid hoisting with low maintenance. They combine the most modern advantages with unusual structural strength.

RELIABLE cage performance is necessary to modern efficiency. Interruptions make costs mount tremendously. THESE CAGES KEEP GOING.

THE splendid structural and operating advantages of these cages are described in our Bulletin 52. Let us send it. HOLMES equipment includes Sheaves, Coal Lowering Spirals, Electric Car Retarders, Hoists, Handling and Weighing Equipment and Complete Tipples.

Robt. Holmes & Bros., Inc.
 DANVILLE, ILL.



LIGHT PUSH CARS

FOR TOOLS, DRILLS, etc.
 APPROXIMATE WEIGHT 400 lbs.

EGYPTIAN MINE CARS,
 TIMKEN EQUIPPED

SHAKER DRIVING EQUIPMENT
 BALL FACE, SELF ALIGNING ECCENTRICS

REID SAFETY FROGS
 WITH SWITCHES COMPLETE

EGYPTIAN IRON WORKS

DEPT. M—MURPHYSBORO, ILLINOIS
 Write for further information and prices

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“... we have been running 150 cars with long haulage and steep incline for seven years and they are still going good . . . we have other trucks that have broken down within less than two years . . .”

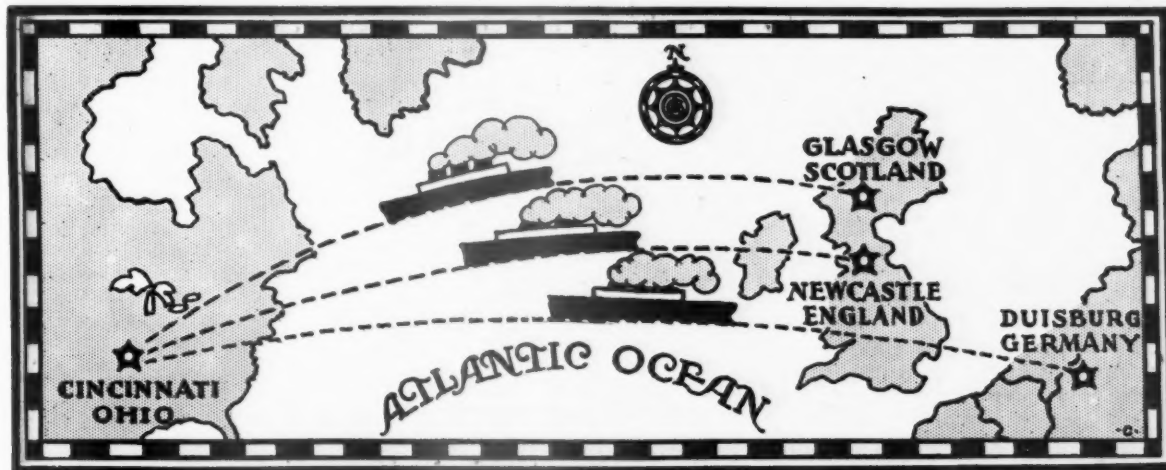
“Lower Haulage Costs Higher Net Profits” quotes many similar experiences and gives reasons for the success of Enterprise cars. Let us send a copy.

SALES AGENTS: Birmingham, A. J. Bowron; Denver, O. H. Davidson; Middlesboro, Rogan & Rogan Co.

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WHEEL & CAR CORPORATION
Bristol, Va.-Tenn. Huntington, W. Va.

Do You Want More Business?



Then Here It Is

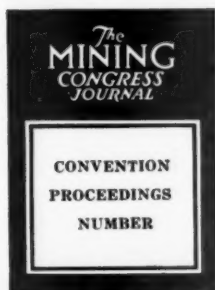
Men came to Cincinnati last month from all over the United States . . . from Canada, England, Scotland, even Germany, 4,000 miles away . . . to attend the 8th Annual American Mining Congress Coal Convention and Exposition.

All of these men were intensely interested in *some* phase of mining but most of them were executives, officials, or practical operating men . . . the *men who buy* mining equipment.

And *now* . . . in the forthcoming CONVENTION PROCEEDINGS NUMBER of The Mining Congress Journal . . . the great 1931 Convention and Exposition is to swing open its doors once more. And this time not only to these men but also to those thousands of others who did *not* go to Cincinnati.

For *this* issue of the JOURNAL is the one containing the complete Convention Papers. It is one that is read with eager interest by coal men throughout the world. It is an issue consulted repeatedly by men who often base their purchase of new equipment upon the contents of its pages . . . men who will spend thousands of dollars *this* year on equipment similar to yours.

Here is business if you want it. And NOW is the time to go after it. Clip that coupon!



The MINING CONGRESS JOURNAL
841 MUNSEY BUILDING
WASHINGTON, D. C.

Please send me full information about advertising and rates in your CONVENTION PROCEEDINGS NUMBER.

NAME
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500 SKULLGARDS

To Be Given Away **ABSOLUTELY FREE** Without Obligation!

DURABLE
LIGHTWEIGHT
COMFORTABLE
INEXPENSIVE



MANUFACTURED
IN STANDARD
CAP SIZES FROM
6 to 7½ INCLUSIVE

SKULLGARD

The New M-S-A Protective Cap

Protects the SKULL from Injuries

To each one of the First Five Hundred Mining Men who comply with the following Contest Rules, the Mine Safety Appliances Company will present a SKULLGARD—the New M-S-A Protective Cap.

CONTEST RULES

FIRST—Carefully fill in the coupon below, clip and attach it to your company letterhead.

SECOND—On the letterhead, write three brief reasons why Adequate Head Protection is needed for all underground men.

THIRD—Mail letter head, with coupon properly attached, to Contest Editor, Mine Safety Appliances Company, Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

FOURTH—Reply must be mailed on or before July 15, 1931.

DON'T DELAY—SEND IN YOUR REASONS TODAY!

Mine Safety  *Appliances Co.*

Braddock, Thomas and Meade Sts., Pittsburgh, Pa.

"EVERYTHING FOR MINE AND INDUSTRIAL SAFETY"

NOTE—THIS COUPON MUST BE PROPERLY FILLED IN, CLIPPED AND ATTACHED TO YOUR COMPANY LETTERHEAD IN ORDER TO RECEIVE CONSIDERATION. BE SURE TO SPECIFY THE SIZE OF CAP YOU WEAR.

CONTEST EDITOR—MINE SAFETY APPLIANCES COMPANY
Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

Attached, please note three reasons written on our company letterhead why I favor Adequate Head Protection for all underground workmen.

MY NAME _____ TITLE _____ CAP SIZE _____
COMPANY _____ ADDRESS _____

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